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Challenges to the Implementation of Scientifically Based Research in General and Special Education Practice

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Challenges to the Implementation of Scientifically Based Research in General and Special Education Practice

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Dedication

This dissertation is dedicated to my husband, Dennis Bach. Without his love and support, I would never have completed this journey.

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Challenges to the Implementation of Scientifically Based Research in General and Special Education Practice

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No Child Left Behind Act of 2001 (NCLB) requires the use of scientifically based research (SBR) to guide the selection of appropriate educational interventions. Although NCLB does not stipulate the use of scientifically based research specific to special education, its provisions influence the education of all children. The implementation of scientifically based research is complex and relies on the knowledge and beliefs of practitioners in general and special education. In order to utilize scientifically based research, there is a need to know the level of knowledge and attitudes of practitioners relative to scientifically based research. This study examines the relationship between practitioners' beliefs and actions taken when implementing scientifically based research. The theoretical framework of Argyris and Schön (1974) provides a conceptual framework for the interpretation of the data. Connections between scientifically based research, school leadership, practitioners, and students, including those with disabilities, are also examined.

Information and results extracted from survey responses of 403 middle school

teachers from a large, urban school district in Texas shed light on how knowledge and beliefs can influence the understanding and the implementation of scientifically based interventions. The results indicate that teachers are somewhat knowledgeable about scientifically based research and interventions. However, their responses to three open-ended questions provide increased insight into their actual knowledge and understanding. The results indicate that initially teachers are in need of more knowledge about scientifically based research and what constitutes quality research. Their responses also indicate that teachers are lacking concise information that would help them understand what makes an effective scientifically based intervention.

Teachers could through college or university classes be better prepared to use scientifically based interventions in the classroom. In the classroom, teachers need administrative support, continuous mentoring and coaching, and effective professional development in order to implement interventions with fidelity. Both general and special education teachers need increased knowledge to use scientifically based interventions effectively to increase student learning.

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Chapter 1: Scientifically Based Research in General and Special Education Classrooms

Teachers of middle school students have limited time to reduce or eliminate existing, sizable academic deficits in students with special needs (Fuchs, Fuchs, & Compton, 2010). A quarter of the students with learning disabilities (LD) are more than three years below grade level in math and reading by the time they reach high school (Fuchs et al., 2010). The intellectual development that occurs during the middle school years can either increase or decrease the adolescents' personal involvement in their own learning and education (National Middle School Association, 2003). This premise, coupled with the crisis in adolescent literacy detailed by the Alliance for Excellent Education (2006), describes a conflicted picture for students with learning difficulties. Scientifically based interventions successfully implemented are thought to be a means of helping middle school students acquire the academic skills needed to be successful in their content-area courses.

STATEMENT OF THE PROBLEM

No Child Left Behind Act of 2001 (NCLB) requires the use of scientifically based research to guide the identification of appropriate educational interventions. Schools across the nation are to implement interventions backed by rigorous research as a means to help close the achievement gap between categories of students and create the best educational opportunities for all students (Simpson, LaCava, & Graner, 2004). No Child Left Behind describes scientifically based research as research that is rigorous and

systematic (NCLB, 2001) and, as Slavin (2003) observes, expresses a preference for randomized experiments or quasi-experiments that can be replicated and generalized.

Although NCLB (2001) does not have provisions for the use of scientifically based research that are specific to special education, its mandates are to be applied to the education of all children, including those with disabilities. Because one of the overarching goals of NCLB is documented adequate yearly progress (AYP), all states and schools are held accountable for improving the achievement of all students (Simpson et al., 2004). Adequate yearly progress is based on students' results on a single statewide, standardized test (U. S. Department of Education, 2002). Intervention research that is well organized, implemented, and integrated should improve the services to all students, including students with disabilities and their families. Prudent investments in sound research have the potential to increase the academic success, social success, and life skills of children with disabilities, and provide them with a free and appropriate education (Gersten, Baker, & Lloyd, 2000; Odom et al., 2005).

In order to utilize scientifically based research effectively and be in compliance with Individuals with Disabilities Education Improvement Act (2004) and NCLB (2001), there is a need to know the level of knowledge and beliefs of both general and special education researchers relative to scientifically based research. Such knowledge promises a framework to extrude and draw conclusions on the efficacy of the mandated scientifically based research process and how it benefits both students and practitioners on the school campus. This information could inform policymakers who create state and

district guidelines. Further, this knowledge could provide insight into the efficiency of scientifically based research.

Scientifically Based Research

Although, NCLB (2001) has defined criteria for identifying scientifically based research, researchers in the field of education, especially special education, have also systematically identified what they consider valid research standards. Both the National Research Council (NRC) and Council for Exceptional Children (CEC) have developed their own guidelines. These similarities and differences have added another dimension to what constitutes good educational research.

Scientifically Based Research and the "Gold" Standard

NCLB (2001) statutes outline how experimental research should play a role in the transformation of education into a more evidence-based practice. An assumption in experimental research is that randomized assignment of subjects to two or more groups when implementing an intervention or treatment lessens the bias treatment effects (U. S. Department of Education, 2003). These randomized, controlled trials are considered the "gold" standard of research under NCLB. Researchers must employ empirical methods (experimental, quasi-experimental) that involve rigorous data analysis, are replicable, and peer-reviewed (Slavin, 2008). These new standards for educational research replicate research methodology that is often used in other disciplines, such as medicine and psychology. The official definition in legislation of scientifically based research is found in Table 1.1.

Table: 1.1

Definition of Scientifically Based Research

The term "scientifically based research"

> (A) Means research that involves the application of rigorous, systematic, and objective procedures to obtain reliable and valid knowledge relevant to education activities and programs; and
>
> (B) Includes research that:
>
> > (i) Employs systematic, empirical methods that draw on observation or experiment;
> >
> > (ii) Involves rigorous data analyses that are adequate to test the stated hypotheses and justify the general conclusions drawn;
> >
> > (iii) Relies on measurements or observational methods that provide reliable and valid data across evaluators and observers, across multiple measurements and observations, and across studies by the same or different investigators;
> >
> > (iv) Is evaluated using experimental or quasi-experimental designs in which individuals, entities, programs, or activities are assigned to different conditions and with appropriate controls to evaluate the effects of the condition of interest, with a preference for random- assignment experiments, or other designs to the extent that those designs contain within- condition or across-condition;
> >
> > (v) Ensures that experimental studies are presented in sufficient detail and clarity to allow for replication, or, at a minimum, offer the opportunity to build systematically on their findings; and
> >
> > (vi) Has been accepted by a peer-reviewed journal or approved by a panel of independent experts through a comparably rigorous, objective, and scientific review (NCLB, 2001, pp. 126-127)

National Research Council

Concerned that NCLB (2001) was focusing attention on only one research method (randomized trials), the NRC (2002) identified guiding principles and standards for education research. These standards guided by a set of fundamental principles and enforced by the research community underlie all scientific inquiry, including education research (National Research Council, 2002, pp. 3-5).

Both NCLB (2001) and NRC guidelines are similar. Neither requires researchers to compromise their use of accepted scientific methods (Algozzine, 2003). However, qualitative, single-case, and correlational research common in special education are not specifically discussed in scientifically based research. Ortiz and Yates (2008) discuss that the Institute of Education Sciences (IES), the research arm of the U. S. Department of Education, utilizes the same six principles as the National Research Council found in Towne, Wise, and Winters (2004). The National Research Council (2002) principles are described in Table 1.2.

Table: 1.2

Guiding Principles for Scientifically Based Education Research

Principles	Defining Characteristics
Principle 1: Pose significant questions that can be investigated empirically.	Posed to solve a specific problem Test an existing theory of thought Clarify educational situation Test or refute passed question
Principle 2: Link research to relevant theory	Theory and models linked together Deeper understanding of question, Methodology and interpretation of results
Principle 3: Use methods that permit direct investigation of the question	Driven by good, clearly stated research questions
Principle 4: Provide coherent, explicit chain of reasoning	Relevant to current issues Conclusions lead to further research questions New questions either support or refute original research
Principle 5: Replicate and generalize across studies	Replication is close to reliability Research findings can be applied to other situations
Principle 6: Disclose research to encourage professional scrutiny and critique	Research complies with research community criteria Disseminated in peer-reviewed journals Incorporate knowledge in field of study Research reaches practitioners and the public

Council for Exceptional Children

Research in the field of special education is unique due to the complexity of its participants. The Council for Exceptional Children task force, created in 2003, provides research quality indicators that address research questions, effective practices, and research methodologies within the field of special education. The task force identified four types of research methodologies: (a) experimental group, (b) correlational, (c) single subject, and (d) qualitative designs. Quality indicators are established for each research methodology that supported their contributions to the field of special education (Odom et al., 2005). The quality indicators support the conclusion that research methodologies exist on a continuum if effective interventions are to be identified for students with disabilities (Odom et al., 2005). Because the field of educational research is complicated, defining which research methods are best for specific student populations is complex.

SIGNIFICANCE OF THE PROBLEM

The Nature of Special Education and Special Education Research

The individual needs of students receiving special education services are unique and complex. The identification of academic needs, the timeline of services, and other issues make scientifically based research and, consequently, effective interventions crucial to their academic success.

One feature that makes special education research more complex is the variability of the participants (Odom et al., 2005). IDEA (2004) identifies 13 eligibility categories. Each of these categories has different identifiable characteristics of students which create

more challenges in designing studies, including appropriate subjects and analyzing unique data that meet the gold standard of randomized assignment to treatment and control groups. Scientifically based research designs do not lend themselves to small samples of students. Yet with low-incidence disabilities such as autism, hearing or visual impairments, etc., there are simply not enough students for assignment to intervention and control groups to provide sufficient subject size for experimental or quasi-experimental research (Odom et al., 2005). This is especially difficult given the wide variation in attributes of students with low-incidence disabilities such as blindness, deafness, and other severe disabilities (Spooner & Browder, 2003). Scientifically based research guidelines typically require a sample size of 250 or more participants to be sufficient to determine a statistical difference between an intervention and a control group (U.S. Department of Education, 2003; Slavin, 2008). Single-case research (involving only one participant) plays an important role in identifying evidence-based practices in special education (Tankersley, Harjusola-Webb, & Landrum, 2008). Horner and colleagues (2005) have recommended seven quality indicators to assess single-subject studies to determine if they are valid and can be replicated. The quality indicators within single-subject research: (a) description of participants and setting; (b) dependent variable; (c) independent variable; (d) baseline; (e) experimental control/ internal validity; (f) external validity; and (g) social validity (Horner et al., 2005). The authors also recommend that at least five studies be conducted by at least three different researchers across three different geographical locations and cumulatively include a participant total

of 20 or more. The final research must be published in a peer-reviewed journal (Tankersley, Cook, & Cook, 2008).

Another feature that makes research challenging is that students with disabilities may also attend special schools or be served at alternative locations separate from the general school population. There are simply not enough students in these special locations to capture comparable interventions in similar controlled contexts for a definitive scientifically based research design. For example, the best practices for students in urban areas may need to be adapted when applied to students with disabilities in rural communities (Collins & Salzberg, 2005).

Yet another difficulty in comparability is the complexity of special education intervention contexts and time frames. The continuum of special education services extends beyond the typical school context and time frames (Odom et al., 2005). Special education services can start at birth and end with the transition out of high school and into the workplace in a continuum of service locations from the general education classroom to homebound services or isolated institutions. Spooner and Browder (2003) state that special education questions cannot be addressed without knowing who the research affects, what practice is being examined, and in what context the research is occurring.

Scientifically Based Research and Inherent Complications

Although NCLB (2001) states that research needs to follow the guidelines of scientifically based research favoring randomized trials, Odom et al. (2005) suggest there are four types of research methodology (viz., experimental group, correlational, single-

subject, and qualitative designs) important to research and to the development of a continuum of effective practices in special education. Each methodology should be matched to the questions that need to be answered and build the foundation for the development of applied research and effective practices (Odom et al., 2005)

Hardman and Dawson (2008) posit that the essence of special education is individualized instruction based on the individual needs of each student. Because of this focus to individualize for students, special education research uses "*N* of 1" studies or single subject design research models to investigate interventions for the individual learner (Horner et al., 2005). Simpson (2005) states that when special educators are concerned with the behavior of individual students (e.g., autism spectrum disorder), observational data are collected about the individual student and the unique contexts in which they are served. Outcomes of individual observational data make the interpretation of results across studies difficult. Methods used in special education such as functional assessment procedures and analysis of these data from the assessments can be quite difficult to structure in traditional scientifically based research designs. The standardization processes required in scientifically based research do not apply to assessments and interventions designed for only one specific student (Spooner & Browder, 2003). The research results needed by special educators concerned with the behavior of individual students and the effects of interventions for this one student are not well addressed in scientifically based research methodology (Collins & Salzberg, 2005). The results of group design experiments, involving sufficient sample size, reflect the

performance of the group. The performance of any individual student or even when several such students are aggregated does not necessarily describe group results. Given the focus of individually designed treatments or interventions for special education students, it becomes difficult or impossible to deduce group effects (Collins & Salzberg, 2005).

A random sample can be generalized across a population and still leave out low-incidence subgroups, such as the deaf or visually impaired (Crain & Kluwin, 2006). Issues of disabilities are often developmental; therefore, health issues or learning difficulties may change rapidly or more slowly through the typical developmental stages. Students with multiple disabilities may exhibit a wide range of disabilities including learning difficulties, mobility problems, language impairments, health issues, and behavior concerns. It is difficult to specify which research questions need to be addressed and in what order to benefit the individual needs of students with multiple disabilities (Giangreco & Taylor, 2003). Such variations in development may complicate subject selection, time of treatment, implementation, or control. Difficulties arise when trying to match up multiple, contextual variables and the prescribed methodology. However, since a cornerstone of special education and IDEA (2004) is appropriate individualization, these unique characteristics of students with disabilities cannot be ignored in research designs (Giangreco & Taylor, 2003).

Single case research may identify an optimum intervention, evaluate the effects of the intervention, and allow treatment modifications for specific individuals or small

groups of similar students. It can also provide systematic documentation of the rehabilitation outcomes of students receiving clinical treatment or other interventions (Zhan & Ottenbacher, 2001).

Other Research Methods

Historically, non-experimental research designs have been used to inform educational practice. Many researchers believe non-experimental designs address "why" questions and are more practical to implement (Dimsdale & Kutner, 2004). Qualitative research methods can define complex problems, frame important questions, or generate new theories and concepts that aid in the understanding of education and disabilities (Feuer, Towne, & Shavelson, 2002; Giangreco & Taylor, 2003). Multiple qualitative research methods examine important research questions and create a bridge between experimental and non-experimental research. Brantlinger, Jimenez, Klingner, Pugach, and Richardson (2005) outline quality indicators for three common data collection methods (i.e., observations, interviews, and document analysis). The authors state that qualitative research should include information about validity and reliability to increase credibility and trustworthiness (McDuffie & Scruggs, 2008).

Correlational studies may also be useful in informing practice and policymaking. Current research methods may help frame valuable research questions related to persons with disabilities and can influence scientifically based research for these individuals.

THEORETICAL FRAMEWORK

Theory of Action and Theory of Use

Teachers are the decision-makers when it comes to the implementation of research-based interventions in their classrooms. They often claim to like a new program but then close their doors and continue to teach utilizing approaches they know and are comfortable using (Boardman, Arguelles, Vaughn, Hughs, & Klingner, 2005). Argyris and Schön (1974) provide a theory that examines "espoused theories" and "theories-of-use" of people within organizations. The authors offered the following definition of espoused and theory-in-use.

> When someone is asked how he would behave under certain circumstances, the answer he usually gives is his espoused theory of action for that situation. This is the theory of action to which he gives allegiance, and which, upon request, he communicates to others. However, the theory that actually governs his actions is his theory-in-use, which may or may not be compatible with his espoused theory; furthermore, the individual may or may not be aware of the incompatibility of the two theories. (pp. 6-7)

According to Argyris and Schön (1974) there is incongruence between what people state as their beliefs and their theory-in-use, actual behavior within the

organization. This "double talk" demonstrates how people shift from one reality to another (Sandberg & Targama, 2007). By observing the people in organizations, their personal or organizational behavior will identify their theory-in-use, making it unnecessary to ask what they actually believe (Winchip, 1995).

Organizational Behaviors

Single-looping

Argyris and Schön (1974) identify two forms of learning that take place in the workplace. The first theory-in-use is called *single-loop* learning where people ask "one-dimensional questions to elicit one-dimensional answers" (Argyris, 1994, p. 78). This limited learning system is shaped by a common set of variables (Table 1.3). These variables unilaterally define and achieve goals, maximize winning, minimize saying anything negative, and always protect others from being hurt. At the same time, they can create an atmosphere of negativity that inhibits the organization and its workers from learning and growing (Argyris & Schön, 1974). Because single-loop strategies are often unsuccessful, people involved become defensive and want to blame others for their failures. Self-protection is crucial and reasoning is abandoned (Argyris, 1994). Everyone has learned ways of dealing with difficult situations and have designed mechanisms to deal with our own actions and the actions of others (Argyris, 1994). One example would be a teacher whose students did poorly on a state assessment. When asked why the students performed poorly, the teacher would respond it was because the students were not motivated or were from poverty homes instead of reflecting on classroom practices.

Double-looping

The second theory-in-use is called *double-looping*. The variables in double-looping encourage the reflection of one's own behavior and assumptions and "turns the question back on the questioner" (Argyris, 1994, p. 78). Double-looping (Table 1.3) examines organizational learning patterns and requires new routines to be established thus encouraging the use of valid information, informed choices, and the monitoring of effective practices (Argyris, 1994).

Table: 1.3

Theory in Use

Model 1: Theory-in-Use (single loop)	**Model 2: Theory-in-Use (double-loop)**
1. Define goals and try to achieve them (unilaterally)	1. Valid information
2. Maximize winning and minimizing losing	2. Free and informed choice
3. Minimize generating or expressing negative feelings	3. Internal commitment to the choice and constant monitoring of implementation
4. Be rational	

Argyris and Schön, 1974, p. 6-7

Ideally, administrators and teachers select an intervention based on scientifically

based research. Working together, the intervention is implemented, monitored, and evaluated for increased student learning. When necessary, changes are made to increase the effectiveness of the intervention. Both administrators and teachers are committed, resulting in compatible espoused beliefs and actions.

Espoused vs. Theory–in-Use Contradictions

Difficulties arise for individuals or organizations when espoused theory and theory-in-use are incompatible (Argyris & Schön, 1974). The desired result of applying the theories would be to understand the discrepancy between the two theories and close the gap between stated beliefs and actual actions, increasing the effectiveness of our daily actions. This in effect brings espoused beliefs closer to what others observe as our actions (Argyris & Schön, 1974).

RATIONALE AND SIGNIFICANCE OF THE STUDY

The whole process of translating scientifically based research into practice is complicated (U. S. Department of Education, 2003). Large amounts of information and data must be transferred from the research context to the classroom. This process involves researchers, policymakers, administrators, and practitioners who use their best judgment in implementing best practices in the classroom. Each group of people also has a professional, ethical, and moral responsibility to do their part in closing the achievement gap among middle school students in their schools. However, there are many possible roadblocks that need to be identified and dealt with in a proactive manner.

PURPOSE OF THE STUDY

The purpose of this study was to examine the middle school teachers' knowledge and beliefs about the requirements of NCLB (2001) and their implementation of scientifically based interventions with students with or without disabilities. Middle school teachers were chosen for the sample because there is a lack of research at the middle school level relative to scientifically based research and interventions. By understanding the purpose and value of scientifically based research and how evidence-based practices enhance teacher knowledge and student achievement, teachers will begin to close achievement gaps. The following research questions guided the inquiry:

1. What knowledge do middle school teachers have about scientifically based research?
2. Where do middle school teachers acquire their knowledge about scientifically-based interventions?
3. How do middle school teachers utilize scientifically based interventions with all students, with or without disabilities, in their schools?
4. What are the beliefs of middle school teachers about the importance of scientifically based interventions?

Organization of the Study

This study is organized into five chapters. Chapter 1 discusses the significance of scientifically based research and the differing opinions on what constitutes good research criteria held by members of the general and special education research community. Chapter 2 examines literature focused on teachers' beliefs about scientifically based

research and the implementation of scientifically based interventions. Chapter 3 describes the process used to gather information about the knowledge and beliefs of teachers in relationship to scientifically based research and interventions. The results of the survey are shared in Chapter 4. Chapter 5 discusses the conclusions and implications of the research study.

Chapter 2: Review of Related Literature

Cortiella (2007) stated that almost 14% of school-age children, some 6.6 million, received some type of special education services. Yet, a large majority of students with disabilities (84%) spend the majority of their day in general education classrooms (Cortiella, 2007). The author found that the general education teacher used the same instructional materials with all students, including students with disabilities (Cortiella, 2007). The Alliance for Excellent Education (2006) noted that schools have the choice to hire reading teachers, develop tutoring programs, or invest in intervention programs to help close the achievement gap between students with disabilities and typically achieving peers and, thus, create the best educational opportunities for all students (Simpson et al., 2004; Kretlow & Heif, 2013). However, current legislation mandated these practices should be scientifically-based. This chapter reviews literature related to middle school teachers' knowledge and beliefs about current legislation that requires the implementation of scientifically based interventions, outlines a theoretical framework, and examines the teachers' beliefs and actions about instructional practices.

CURRENT LEGISLATION

Current legislation (IDEA, 2004; U. S. Department of Education, 2003; NCLB, 2001) requires the use of scientifically based practices along with a student's response to these practices when determining whether a disability is present (Kretlow & Heif, 2013). Kretlow and Heif (2013) state, "in theory, when evidence-based reading instruction implemented with fidelity is in place, it *should* [emphasis in original] eliminate

instruction as a reason for students not making adequate progress" (p. 168).

The legislative intent of NCLB (2001) legislation has focused on all students, including those with disabilities, to succeed academically and meet the accountability standards set forth by each respective state. In addition, the law required that in order to reach these standards, schools must provide a rigorous, evidence-based curriculum. Consequently, student achievement correlated to school success determined if adequate yearly progress was being made. Within the least restrictive environment (IDEA, 2004), and the context of general education, the law required students with disabilities to receive instruction necessary to acquire skills needed to meet state standards and federal guidelines. The law noted that if adequate yearly progress was not made, the federal government would hold teachers and schools responsible (Hardman & Dawson, 2008).

IDEA (2004) ensured the right to a free appropriate public education that included an Individualized Education Program (IEP). When an intervention is individually developed and prescribed per the IEP, legally mandated scientifically based research standards may, in fact, be impossible due to the requirement for random assignment found in experimental studies or quasi-experimental studies (Odom et al., 2005).

NCLB (2001) was designed to help close the achievement gap among disadvantaged, minority students with disabilities and their peers (Smith, 2003). Therefore the relationship of scientifically based research and the disproportionate representation of certain minority groups, including English Language Learners in special education (Zhang & Katsiyannis, 2002; Ortiz & Yates, 2008), was a critical component in

responding to the law. Such diversity and demographic identification has added other strata when using randomized groupings in special education research, further complicating research designs and obtaining sufficient sample sizes.

Scientifically Based Research

Scientifically based research is to provide guidelines in the identification of appropriate educational interventions. According to NCLB (2001), scientifically based research is described as research that is rigorous and systematic (NCLB, 2001). In addition, Slavin (2003) observed that NCLB appears to support either randomized experiments or quasi-experiments that can be replicated and generalized. Prudent investments in sound research have shown the potential to increase academic success of children with disabilities (Gersten et al., 2000; Odom et al., 2005).

Within the least restrictive environment (IDEA, 2004), and the context of general education, the legislation has required that students with disabilities receive instruction necessary to acquire skills needed to meet state standards and federal guidelines. In order to utilize scientifically based research and be in compliance with IDEA (2004) and NCLB (2001), critical levels of knowledge and positive attitudes of both general and special education researchers and practitioners is necessary.

Gersten and colleagues (2000) stated the best strategy for improving accessibility to effective instructional methods and programs for individuals with disabilities is through research. Appropriate application of scientifically based research may assist in addressing significant questions and gathering information on interventions that equip

teachers and parents to help children (Simpson, 2005). One goal of NCLB (2001) was to shift educational practice from a system in which schools were regulated and evaluated by bureaucratic policies, to schools that were regulated, evaluated, and legitimized by the student achievement results (Simpson et al., 2004).

Research and the Research Community

The transference of information from the research level to the classrooms has been crucial to the success of NCLB (2001) and research. Researchers were not always successful at disseminating their research. Klingner, Ahwee, Pilonieta, and Menendez (2003) posited ways that researchers may help accomplish this task. They suggested actively involving teachers in research and implementation of new programs; thus, demonstrating the value of the practice while providing materials, and mentors. In addition, Simpson et al. (2004) noted that professional trainers modeled and taught practitioners to discriminate between proven and unproven educational methods and strategies. Both trainers and professionals in training knew the difference between testimonial and empirical evidence (Yell, Drasgow, & Lowrey, 2005).

Adoption of best practices in special education has been complicated by the separation of special education and general education professionals in pre-service and continuing education training. Typically, the training of these two complementary professional groups has been isolated with little integration occurring. Without linkages of preparation and shared responsibility for providing services between general and special education, furnishing appropriate education services to students with disabilities

has been a difficult task (Boardman et al., 2005). Typically, scientifically based research results has been disseminated, often from the perspective of the general education context, with limited application of the results to students with special needs or consideration of the varied the contexts that serve them. Therefore, each complementary discipline has been disconnected from the other in their training needs (Boardman et al., 2005).

Research and the School Campus

NCLB (2001) has stipulated that schools implement products and programs based on scientifically based research and required state departments, school administrators, principals and teachers to collaborate to ensure research-based practices are used with all students (Yell et al., 2005). Simpson et al. (2003) recommended that decisions regarding scientifically based research be made at the local level by professionals who are knowledgeable, have accurate information regarding student characteristics and circumstances specific to their school, and can create the conditions necessary to derive the expected results. The authors placed the responsibility for scientifically based research and site-based interventions in the hands of campus administrators and classroom teachers in both general and special education.

Research and Training

Instructional practices based on research have worked in the classroom if teachers have the needed training, skills, time, materials, and support from the administration (Browder & Cooper-Duffy, 2003). Simpson and colleagues (2004) found that high

quality professional development that is both goal-oriented and a continuous process provides teachers and educators with a stockpile of effective practices and skills needed to carry research-identified methods into the classroom (Simpson et al., 2004).

After effective practices are identified and implemented on the school level, the provision of continuous feedback related to these practices and the effect in individual classrooms was found to be necessary. Snell (2003) suggested that researchers and educators work together to create and implement policies and procedures that continuously evaluate student growth and produced outcome data. Only through this collaboration between researchers and teachers, fully supported by administration, had the interventions proven to be effective and produced positive outcomes (Browder & Cooper-Duffy, 2003; Klingner et al., 2003).

In addition to experiencing professional development, Simpson and colleagues (2004) posited that teachers and other educators need to utilize professional literature and apply that literature appropriately when working with students with disabilities. The authors added that teachers needed to become critical evaluators of educational products, impartial in evaluating educational products and strategies. Further, teachers needed to learn how to collect data in their classrooms as well as network with other educators and professional organizations to build a knowledge base of effective interventions that meet scientifically based research guidelines (Simpson et al., 2004).

To utilize research and be in compliance with IDEA (2004) and NCLB (2001), the level of knowledge and beliefs of general and special education researchers and

practitioners relative to scientifically based research must be identified. Such knowledge provides a framework to extrude and draw conclusions on the efficacy of the mandated research process and how it benefits students and practitioners on the school campus and policymakers who create state and district guidelines.

THEORETICAL FRAMEWORK

Argyris and Schön (1974) offered a theory of organizational behavior that can be applied to the implementation of the mandates under No Child Left Behind (2001) and IDEA (2004). The authors stated the following definition of espoused theory and theory of action.

> When someone is asked how he would behave under certain circumstances, the answer he usually gives is his espoused theory of action for that situation. This is the theory of action to which he gives allegiance, and which, upon request, he communicates to others. However, the theory that actually governs his actions is his theory-in-use, which may or may not becompatible with his espoused theory; furthermore, the individual may or may not be aware of the incompatibility of the two theories (pp. 6-7).

Argyris and Schön's (1974) theory of organizational behavior when applied to the implementation of the mandates under No Child Left Behind (NCLB, 2001) and IDEA (2004) structures intertwining connections at multiple levels, all concerned with best

practices in education. In this model, each level shows espoused beliefs, Model 1 theory-in-use dilemmas, and Model 2 theory-in-use actions.

Model 1

The mandates of NCLB (2001) exemplify Model 1 theory-in-use. The law mandated that schools meet the prescribed standards of adequately yearly progress to avoid the enforcement of punitive actions at the state and school level. The regulations provided specific criteria for identifying low performing schools as schools in need of improvement. The top down implementation of the NCLB (2001) standards did not support Model 2 theory-in-use actions since the law was based on accountability results in schools, with teachers having little room for negotiation regarding implementation. Compliance with the federal mandates found in NCLB was established as a legal issue, a Model 1 theory-in-use, which cannot be changed by the campus advisory team.

Argyris and Schön (1974) found that there was often incongruence between what people stated as their beliefs and their theory-in-use, actual behavior within the organization. Traditional schools and many current teaching practices have been full of espoused beliefs (Model 1) and theory-in-use actions (Model 2). Typically, schools stated that the education of all students is the highest priority yet when examining the infrastructure it became apparent that accountability often took precedence over individual student needs.

Model 2

Argyris and Schön (1974) referred to the second type of theory-in-use as *double-*

looping. The variables in double-looping encouraged the reflection of one's behavior and assumptions and "turns the question back on the questioner" (Argyris, 1994, p. 78). Double-looping examined organizational learning patterns and required new routines to be based on feedback (Argyris, 1994). It also encouraged the use of valid information, informed choices, and the monitoring of effective practices (Argyris, 1974).

Argyris & Schön (1974) suggested that difficulties arise for individuals or organizations when espoused theory and theory-in-use were incompatible. They stated that the desired result of applying the theories is to understand the discrepancy between the two theories and close the gap between stated beliefs and actual actions, thus, increasing the effectiveness of our daily actions and bringing espoused beliefs closer to what others observe as our actions. Such an application of theory would appear to be particularly applicable to "knowledge" of scientifically based interventions and actual "use" of the research.

TEACHERS' BELIEFS AND ACTIONS IN RELATION TO INSTRUCTIONAL PRACTICES

Guskey (1988) offered a historical perspective of teachers' attitudes towards implementation of mastery learning instructional strategies. The study was designed to explore "the relationship between selected teacher perceptions known to be shared by highly effective teachers and teacher attitudes towards the implementation of new instructional practices" (Guskey, 1988, p.63). The participants, who attended staff development on how to implement mastery learning instructional strategies, completed a questionnaire immediately following training. Guskey used the questionnaire data to

investigate the relationship between the perceptions and attitudes of teachers. The "teachers who saw mastery learning as congruent with their present teacher practices rated it less difficult to implement (r = -0.50), requiring less work (r = -0.40) and highly important (r = 0.37)" (p. 67). If mastery learning was different from the present teaching methods of the teachers, their responses were more negative. Guskey acknowledged the continuous need for research examining how teachers' perceptions and attitude are connected to successful instructional practices. The author found that when looking for participants in research projects, volunteers were often the strongest teachers who were positive and most confident about their teaching. Another significant implication was the need for strong leadership in the implementation of instructional innovations (Guskey, 1988).

Stipek and Byler (1997) studied early childhood teachers, pre-kindergarten through first grade. They examined teachers' beliefs about child-centered and skill-centered practices, their actual teaching practices, and how their beliefs and practices were sometimes conflicted. As part of the study, teachers identified their beliefs about the appropriate education of young children by completing a three-part questionnaire created by Stipek, Daniels, Galluzzo, and Milburn (1992). The questions focused on program goals, the endorsement of basic-skills or child-centered practices, parental satisfaction with the early childhood program, school readiness, and standardized tests (Stipek & Byler, 1997). A "strong negative correlation between basic skills and the child-centered beliefs scales for preschool and kindergarten teachers" was found (Stipek & Byler, 1997,

p. 313). The authors proposed one way to effectively change teaching practices was to have the teachers examine their beliefs and practices about early childhood education. Another way to create changes in educational practices was to address the goals and beliefs of the teachers through professional development (Stipek & Byler, 1997).

The Boardman et al. (2005) study focused on special education teachers' views of research-based practices and professional development. Facilitators and research assistants used a focus group interview protocol and a set list of questions to gather qualitative data (Boardman et al., 2005). The data collected were examined using the three-step coding process from Miles and Huberman (1994). Four themes emerged from the data analysis: Program Selection, Program Use, Program Sustainability, and Professional Development and Research (Boardman et al., 2005). Pertaining to program selection, teachers' held attitudes of *what worked* regardless of what they might be *required* to teach. When teachers were expected to use certain techniques prescribed by the district, their responses reflected *no obligation* to do so. A district's lack of retention of programs or instructional practices created frustrations, and teachers were reluctant to invest their time and energy in learning a new program (Boardman et al., 2005). The authors found that barriers to implementation of a program were time, lack of materials and resources, lack of helpful professional development, and change in teaching assignments. Fidelity and sustainability of a new program or practice were affected by student learning, practicability, training and ongoing support. Regarding research, the findings revealed that teachers determined many research-based instructional strategies

were meant for students in general education, not their students with unique needs (Boardman et al., 2005).

Boardman et al. (2005) offered a representative comment, "Well, I find that even if they have research, you can make research basically show whatever you want it to" (p. 176). The results showed that teachers, with information from colleagues, decided they had the expertise to make decisions on how well programs worked in their classrooms. In addition, the authors found that most teachers were not interested in using research-based practices in their classrooms. Effective professional development for teachers with disabilities was discussed as one way to address teacher needs, research-based methods, and evaluation of student progress (Boardman et al., 2005). Snider and Roehl (2007) emphasized similar concerns in classroom and professional issues. The authors discussed how student learning was affected by teachers' beliefs and their ability to identify and use effective instructional practices in the classroom regardless of research knowledge.

Pajare (1992) discussed the complex relationship between beliefs and knowledge, making the study of teachers' beliefs messy. Boardman and colleagues (2005) noted that the pedagogical philosophy of teachers created or hindered change. Further, teachers' beliefs about educational research and effective practices had a direct connection to what happened in their classrooms. It was important that teachers moved beyond the "what might work" mentality to implementing interventions that were evidence-based (Boardman et al., 2005, p. 174). Richardson, Anders, Tidwell, and Lloyd (1991) espoused that constructive change happens only when teachers reflect on what is happening in their

classrooms and understand how the use of other frameworks, such as evidence-based practices, can enhance teacher and student knowledge. If the educational improvement processes continued to ignore teacher beliefs when implementing change, there would continue to be disappointing outcomes when using evidence-based practices (Richardson et al., 1991).

Foss and Kleinsasser (2001) examined the inconsistencies between the pre-service teachers' stated beliefs and their instructional practices teaching mathematics. The authors found that pre-service instructional training did not change the beliefs that teachers brought to the classroom. The study involved a methods instructor and 22 pre-service mathematics teachers (Foss & Kleinsasser, 2001). Multiple elements were used to gather data to triangulate the results. Qualitative instruments consisted of interviews, observations, field notes, artifacts, and videotapes and audiotapes. Quantitative data included surveys, grades, teacher evaluations, and mathematics anxiety rating scales (Foss & Kleinsasser, 2001). The data analyses were guided by Spradley's (1979) model. As the authors collected data, they questioned why there was inconsistency between what the pre-service teachers said and what was being done in their classrooms. Interview and survey responses did not match the pre-service teacher observations (Foss & Kleinsasser, 2001). By using a multiple methods approach to research, the authors identified the need "to implement methods that bring pre-service teachers' beliefs to the forefront during their teacher preparation" (Foss & Kleinsassar, 2001, p. 291).

Landrum, Cook, Tankersley, and Fitzgerald (2007) compared "teachers' views

regarding the usability of teaching techniques" (p. 30) found in professional journals versus information shared by a colleague. One hundred and twenty-seven experienced general and special education teachers, attending masters-level training programs, participated in the study (Landrum et al., 2007). The authors stated that general and special teachers preferred the personal format when acquiring teaching interventions. Teachers with more teaching experience rated usability of different sources of information as less positive (Landrum et al., 2007). Furthermore, the results indicated teachers preferred the endorsement of an experienced colleague when implementing a new practice. Landrum et al. were concerned that colleagues might share information that is not empirically connected to student growth. The authors were concerned that experienced teachers in leadership roles might not consider implementing a new teaching technique. Teachers reported that research-based practices did not address the realities of the classroom and interventions were more useable when presented in a personal, rather than a data-based format (Landrum et al., 2007). The authors concluded that in spite of evidence supporting effective practices, both general and special education teachers were still inconsistent in the utilization of research-based teaching techniques.

Snider and Roehl (2007) focused on teacher beliefs, how their beliefs affected everyday actions in the classroom, and current professional issues in education. The authors suggested beliefs do not require validation, yet play a critical role in shaping teaching practices (Snider & Roehl, 2007). In addition, the authors discussed the accountability movement and the application of scientifically based research (NCLB,

2001) and Response to Intervention (RtI). The authors concluded that teachers are not particularly ideological and rely on experience as well as intuition to make student and classroom decisions. Six hundred kindergarten-through-grade 12 (K-12) general and special education teachers from the Midwest completed the survey. The results revealed teachers' responses to questions regarding their beliefs about constructivist versus explicit teaching practices, as well as classroom and professional issues and whether demographic variables influence teachers' beliefs. The responses to survey items about professional development identified negative responses to NCLB (2001). The findings indicated only 19% of the surveyed teachers stated *scientifically based research is best*. The authors posited this negativity towards NCLB (2001) raised concerns about teachers' preparedness for RtI (Snider & Roehl, 2007). The results of the study showed teachers are often guided by popular trends that are not research-based, whether it is new curriculum, learning styles, or something they know intuitively might work. Lastly, the authors found teachers are conflicted about teaching as an art or a science and are concerned that NCLB (2001) has dictated how and what to teach (Snider & Roehl, 2007).

Richardson et al. (1991) concentrated on beliefs about reading comprehension and classroom practices. A connection between teacher beliefs and practices was assessed in their ethnographic belief interviews (Richardson et al., 1991). The authors interviewed 39 teachers about their beliefs and practices in reading. The first set of questions were designed to elicit teachers' declared or public beliefs about reading and a second set, designed to elicit more private opinions or beliefs in action (Richardson et al., 1991). The

interviews were followed by classroom observations. The authors found several teachers' interviews exhibited a lack of coherence between public convictions and beliefs in action. Richardson et al. (1991) suggested the need for congruence between teachers' beliefs and classroom practices. There was a suggested need in staff development programs to address teachers' theories and beliefs, theoretical frameworks plus current research, and educational practices that tie beliefs with actions.

The gap between research and practice in top-down educational research models, lacked teacher input in changing educational practices, and fails to present teacher friendly research concerns (Abbott, Walton, Tapia, & Greenwood, 1999). Abbott et al. (1999) focused on the Juniper Gardens Children Project (JGCP), a model for uniting researchers and professional development. JGCP was a multi-year, multi-measure, single-subject research at three urban, Title I elementary schools in Kansas City, Kansas. The student cohorts were followed for up to 3 years (Abbott et al., 1999). The project was grounded in the belief that student outcomes and the implementation of research-based practices are connected. This connection was built on the components of partnership, collaboration, consultation, and professional development between teachers and the research community (Abbott et al., 1999). Each participating school designed a program for identified needs of their student population (i.e, autism, learning disabilities, limited English proficient). In conclusion, four lessons were learned: teachers need to support the ongoing research, understand its purpose and procedures, be given time to become active participants, and understand how the interventions will change student performance

(Abbott et al., 1999).

Datnow and Castellano (2000) used "qualitative data gathered in extensive interviews and observations in two Success for All (SFA) schools" (p. 775) to examine teacher beliefs, experiences, and implementation practices. Case study methods were used to examine the two schools and their teachers. Datnow and Castellano (2000) found that teacher support for the SFA program was an ongoing challenge and their interview transcripts identified the following four categories of teachers.

1) Teachers who were strong supporters of the program.

2) Teachers who generally support the program.

3) Teachers who simply accepted the program.

4) Teachers who were vehemently against the program. (p. 785)

The data indicated that the strong supporters for SFA felt their beliefs and the program were a good fit. Further, teachers who used eclectic methods found SFA an improvement while teachers, who pointed out the program was needed by the school, simply accepted the program. Lastly, teachers who opposed the program were vocal about their opinions (Datnow & Castello, 2000). The authors evaluated teacher responses regarding the implementation of the SFA program and three themes emerged. First, they found that the level of support was not a predictor of implementation fidelity. Almost all teachers adapted the program for pedagogical reasons. Facilitators even believed there was a need to allow some adaptations so that teachers would continue to utilize SFA. The second theme showed that teachers had reservations about the program because it was

developed by an external group and constrained their autonomy and creativity. The third theme was teachers supported SFA but felt it stifled teacher creativity and autonomy. Finally, the authors also found that strong administrative support was not enough to guarantee fidelity of implementation of the SFA program (Datnow & Castello, 2000).

Baker, Gersten, Dimino, and Griffiths (2004) completed a follow-up study on the implementation of the Peer Assisted Learning Strategies (PALS) in math. The researchers examined the sustainability of the program several years after the conclusion of the research project and found teachers were still using PALS successfully. Baker et al. gathered data that identified teachers at the mechanical level, routine level, and refined/integrated level. Teachers' concerns were examined, and student learning was an indicator of success and sustainability. The authors concluded that success was based on four factors: (a) sound cornerstones of the innovation, (b) intensive professional development, (c) ongoing support in the classrooms, and (d) teacher autonomy. In addition, it was beneficial that PALS was aligned with district and state standards and had a built-in system to monitor student progress. Further, the campus decided to invest Title I funds to support the program (Baker et al., 2004).

Klingner et al. (2003) focused on the implementation of research practices across six sites. The authors sought to identify how often research-based practices were used, the extent to which teachers modified the practices, barriers that existed, and what helped the teachers the most during the school year. A two-week professional development program was conducted for 29 teachers who learned how to implement four reading

practices in inclusive classrooms. During the professional development, the teachers saw the reading practices modeled, had hands-on practice, chose a practice to implement with their students, prepared materials, discussed barriers, and developed individual implementation plans. Extensive campus support, on-going professional development, and help from graduate assistants were provided. The authors used interviews, teacher and researcher logs, classroom observations and checklists to gather data. The teachers were asked how often they implemented the reading practices, what their level of implementation was, and the barriers that prevented them from being more successful. Using the data, the teachers were ranked as high, moderate, or low implementers of the reading practices. Teachers were identified as high implementers of an educational strategy displayed sufficient fidelity to the program's guidelines. Moderate and low implementers often omitted or modified the program protocol such that the strategy was unrecognizable. The authors reported their previous research demonstrated that the quality and quantity of implementation affected student outcomes (Klingner et al., 2003). Lack of time was identified as a barrier, and some teachers were surprised they would be held accountable for the implementation of at least one of the reading practices. It was concluded that teachers needed to understand how programs increased student success in the classroom and that sustainability and fidelity of program implementation was one way to document student and teacher success over time.

Reis, McCoach, Little, Muller, and Kaniskan (2010) conducted an experimental study that examined the effects of a school-wide enrichment model-reading (SEM-R) on

students' reading fluency and comprehension. The SEM-R approach was derived from an enrichment triad model called school-wide enrichment model (SEM) created by Renzulli (1977). The authors noted that differentiating reading instruction had been a challenge for teachers, and little experimental research has been conducted on its use. The study included 37 classrooms in the treatment group and 33 in the control group. The authors' research questions examined the relationship between the regular reading curriculum and SEM-R, an independent, student interest-based program (Reis et al., 2010). Teachers attended professional development; classroom coaches were assigned, and reading materials were provided. Teacher observations, as well as teacher and student logs, were used to monitor the fidelity of program implementation. At the beginning and end of the study, teachers completed the *Teaching and Reading: Attitudes and Practices Survey (TRAPS)* (Fogarty, Little, & Reis, 2005). The results indicated that teachers' attitudes towards reading were similar in the treatment (M = 5.64) and control groups (M = 5.37). While the treatment and control groups had no significant difference in attitudes towards reading, the data showed that the teachers implementing SEM-R found an increase in student engagement and enjoyment in reading, resulting in higher reading fluency and comprehension scores (Reis et al., 2010).

The studies reviewed suggested a disconnect between teachers' beliefs and actions. Even pre-service training did not always change teacher beliefs or alter their classroom teaching. Teachers continued to be influenced by popular trends that may not be research-based. Carnine (2000) stated that too often schools used programs and

practices based on fads and personal bias. Further, Yell and colleagues (2005) suggested that educators must be able to understand the difference between science, fads, experts, and entrepreneurs to ensure that evidence-based practices or treatments exist in the classrooms. Greenwood and Maheady (2001) argued that the role of teacher educators is to foster the attitude that teaching is based on scientific principles, research has a place in classroom instruction, and teachers can help address the research to practice gap that continues to exist in education. Only when "teachers learn about empirically sound practice in both their initial preparation and ongoing professional development, and that their skills reflect this training, can we predict that students with disabilities will be afforded the most appropriate learning opportunities available" (Landrum, Cook, Tankersley, & Fitzgerald, 2002, p. 48).

Teachers had a tendency to adapt or structure programs to meet their own needs or what they construed as the needs of their students, making it difficult to know whether a program was successful or not (Baker et al., 2004; Datnow & Castellano, 2000; Klingner et al., 2005). The implementation of research-based interventions was affected by many variables: quality professional development, collaboration between researchers and teachers, coaching, fidelity of implementation, accountability, and adaptability of the interventions. There was a need to incorporate guidelines in the decision-making process when selecting teaching strategies and programs that would work with all students, including students with disabilities. The data inferred that the responsibility was at the public school level, at each individual campus, and ultimately, with the classroom

teacher. Compatible espoused and theory-in-use actions of the teachers were necessary to make a difference. Teachers had to see the value in research, be willing to learn what research is important, be involved in selecting interventions, and implement the interventions with fidelity in order to expect improvement to occur from research.

Although the studies examined covered a span of over twenty years, the same issues concerning teachers' actions and evidence-based practices continued. Teachers' beliefs influenced their actions. The fidelity of implementation and the sustainability of an intervention remained in the hands of the practitioner. The Argyris and Schön's (1974) theory applied to the teacher's espoused beliefs about best practices and their theory-in-use actions provided a useful explanation of why the issues still remain. The end product was the need to incorporate guidelines in the decision-making process when selecting teaching strategies and programs that would work with all students, including students with disabilities.

SUMMARY OF THE CHAPTER

This chapter examined the research addressing beliefs teachers have towards using research-based interventions and programs in their classrooms. Results from the literature documented a connection between teacher beliefs' and change.

If teachers are to change and embrace research-based practices, their beliefs need to be addressed. By understanding the purpose and value of scientifically based research and how evidence-based practices enhance teacher knowledge and student achievement, teachers may be able to understand why interventions based on fads and personal bias do

not help close achievement gaps. Through better professional development, classroom and administrative support, and knowledge of what works, teachers can learn to select and implement interventions and programs that worked with all students, especially students with learning disabilities.

Chapter 3: Method

The purpose of this study was to examine data on middle school teachers' knowledge and beliefs about the requirements of NCLB (2001) and the implementation of scientifically based interventions with students with or without disabilities. The U. S. Department of Education (2003) has noted the complexity inherent in the process of translating research into practice has been very complicated. Teachers' knowledge of scientifically based interventions (SBI) and their skill in identifying instructional practices that meet the research criteria, requirements of NCLB (2001) and IDEA (2004), and that are designed to meet the academically needs of all students including those with disabilities as found to be relatively unknown. In addition, a paucity of research has existed on how and from where teachers acquire the information that influence their classroom practices (Landrum et al., 2002). Specifically missing from research has been data on middle school teachers' beliefs and actions.

This chapter describes the study's research design, participant sample, and procedures for recruitment of sample participants. In addition, the chapter includes information on the development of the on-line survey and survey procedures.

RESEARCH QUESTIONS

1. What knowledge do middle school teachers have about scientifically based research?
2. Where do middle school teachers acquire their knowledge about scientifically based interventions?

3. How do middle school teachers utilize scientifically based interventions with all students, with or without disabilities, in their schools?
4. What are the beliefs of middle school teachers about the importance of scientifically based interventions?

RESEARCH DESIGN

An on-line survey created by the researcher was used to gather descriptive data that captured teacher knowledge and beliefs about scientifically based research. The survey explored teachers' knowledge and beliefs about scientifically based interventions, how they utilized the interventions in the classroom, and their perceptions about the importance of using these interventions. The espoused beliefs and theory-in-use models of Argyris and Schön (1974) were used as a conceptual basis to understand how the beliefs and attitudes of teachers determined what research-based practices might or might not take place in the classroom.

The first two research questions addressed teacher knowledge about No Child Left Behind (2001). The teachers' responses to the survey questions identified what they knew about scientifically based research and where they acquired their knowledge. The questions demonstrated the knowledge teachers used to make decisions about interventions and resources they used when making educational decisions.

The last two research questions were designed to identify teachers' beliefs in action. The survey questions collected information about where, when, and what interventions were implemented. Survey questions identified whether teachers considered

scientifically based research and interventions as important. These questions helped identify their theory-in-action or what they actually did with interventions.

In addition, two open-ended questions were included to solicit what interventions teachers were using in the classroom and why they chose these specific interventions to use with their students. The last open-ended question allowed the respondents to share or present any comment they wished regarding their opinions about using scientifically based interventions. The final survey results were examined using the espoused beliefs and action-in-use framework of Argyris and Schön (1974).

Participants and Setting

The participants in the study were teachers who taught in a middle school setting in a school district located in central Texas. The school district was a large, urban (metropolitan) school district with 18 middle schools serving, approximately 16,000 students. The total number of middle school teachers serving students was 1,139. This school district gave permission to conduct the research study, and provided the email addresses of the participants.

For this study, middle school was defined as schools with 6th, 7th, and 8th grade classrooms. All 1,139 middle school teachers listed in the district database were asked to complete the demographics portion of the survey. If the teachers taught content area classes (i.e., language arts, mathematics, social studies, science, and reading) to students in a general education or special education setting, the online survey allowed them to complete the entire survey. If the teachers taught elective classes (i.e., band, art,

keyboarding), they exited the survey after the demographic section. This process made it possible for teachers who had multiple teaching assignments to complete the survey. The identified teachers were responsible for teaching grade level materials and implementing interventions when needed to help close academic gaps with all students, including those with learning disabilities.

SURVEY DEVELOPMENT

The software program, Qualtrics® (Qualtrics Lab Inc., 2013), was used as a data gathering online device to capture each teacher's responses to the survey questions (Appendix A). An introductory letter stated the purpose of the study and indicated that participation was voluntary, and their responses would remain anonymous (Appendix B). The participants read and agreed to complete the survey by signifying "yes," implying they understood the purpose of the survey and agreed to the survey terms. Further, the letter stated that the survey would take approximately 15 minutes and that the participants could exit the survey at any time.

Part I of the survey gathered descriptive demographics (level of education, current instructional setting, years of teaching, experience, areas of certification, grades taught, ethnicity, gender, and age). The demographic data was organized by categories and displayed in Table 4.1.

Part II asked the teacher to respond to survey questions about knowledge and student interventions. First, the teachers were asked to identify their knowledge of the five components identified in NCLB (2001): highly qualified teachers, scientifically

based research, adequate yearly progress, student assessment and accountability, and parental choice of schools. The second question ranked their understanding of the seven criteria found in the definition of scientifically based research (NCLB, 2001, pp. 126-127). (See Table 1.1) The close-ended questions required responses on a 4-point Likert scale and were examined to identify what teachers knew about scientifically based research, components of NCLB (2001), and where or how they acquired this knowledge. The next set of questions identified teachers' level of knowledge about scientifically based research and interventions. Additionally, teachers were asked to identify how they used this information to identify and implement research-based interventions with their students. Two open-ended questions were designed to capture qualitative data from teachers about research and its use in their classroom and school. A third open-ended question allowed the participants to share more detailed information about their personal beliefs and practices about to scientifically based research and the possible benefits and challenges when implementing interventions in their classrooms.

Pilot Study

A pilot study was conducted to resolve issues prior to the main study and to help determine if the questions were yielding the information needed to answer the research questions (Simon, 2011). It also served as a trial run for the major study (Polit, Beck, & Hungler, 2001). The pilot study was conducted six weeks before the final survey was disseminated.

The pilot survey was sent to a small group of respondents using the online data

gathering system Qualtrics® (Qualtrics Lab Inc., 2013). The respondents were educators either completing their doctoral program in Special Education Administration at a large research university or working on a middle school campus. The pilot study asked for feedback about the relevance of each question and the format of the survey. Their feedback on the format and questions in the survey helped identify any unclear or leading questions.

The respondents kept track of the time it took to complete the survey. The feedback indicated that the survey took an average of 10 minutes. One respondent suggested adding a reconsideration choice if a respondent decided not take the survey. Another respondent suggested creating a short answer question to gather names or examples of scientifically based interventions. There was no feedback on the directions to take the survey or any formatting of the questions. A decision was made to offer a chance at winning a $100 Visa Gift card to encourage participation.

Final Survey

The final survey was sent to the 1,139 participants in the large, urban school district. If the survey was not completed within the first week, a reminder email was sent. A second reminder was sent after 2 ½ weeks. The participants had 3 ½ weeks to complete the survey. The recipients received an electronic thank you if the survey was completed. After the survey was closed, the incentive drawing winner was contacted, and a $100 Visa Gift was delivered to the winner the next day.

The survey responses were anonymous. The demographic information was

arranged to prevent the identification of the individual participant but still allowed data analysis by groups (i.e., grade level taught, content area, etc.). The study met the criteria of having adult, voluntary participation with minimal risk, and did not require any action performed outside the research setting. All emails were destroyed after the survey making it impossible to identify individual respondents.

The data collection was completed within a month, and the survey data were entered into Word formatted reports. The reports were stored on computer discs available only for data manipulation and analysis purposes by the researcher. All data were permanently deleted from the survey account within 12 months.

DATA ANALYSIS

Quantitative Analysis

The survey data provided descriptive statistics reporting total responses to the stimulus items. Based on Part I, demographic statistics were aggregated and displayed in tables to describe the respondents (Table 4.1). Part II responses were aggregated for knowledge and experience with research, and the differences were determined for the total number of respondents. Teachers identified how they selected interventions, when they used the interventions, and their level of confidence when implementing them. The responses were aggregated for total number of respondents plus all sub-groups and examined for patterns and trends. The results were tabulated and displayed in tables.

Qualitative Analysis

The open-ended questions sought to identify the teachers' perceptions about scientifically based interventions and whether they were valued and used on their middle school campuses. The first question asked for names or examples of interventions used in the classroom. The next question asked them to provide a rationale for why they selected a certain intervention. The last open-ended question asked for comments about the respondents' opinions regarding the use of scientifically based interventions.

The qualitative responses were sorted using the following intervention definition: an intervention is "an educational program, product, practice, or policy aimed at improving student outcome" (Institute of Education Sciences, 2013). Using a coding process (Miles & Huberman, 1994; Creswell, 2009), the names or examples of interventions provided by the respondents in the first open-ended question were: (a) read carefully to identify possible categories; (b) sorted into researcher identified categories (i.e., programs, strategies, assessments); (c) sorted again to group related categories; and (d) checked for inter-rater reliability by a colleague. The responses for the second open-ended question were also sorted also into categories (i.e., administration, professional development) following the same procedures. The last open-ended question responses were general comments that were examined for categories and trends that addressed areas such as research, professional development, or roadblocks to using scientifically based interventions.

The written responses were then compared to Argyris and Schön's (1974)

conceptual framework. Argyris and Schön found that often there was incongruence between what people stated as their beliefs and their theory-in-use, that is, actual behavior within the organization. The authors observed that difficulties arose for individuals or organizations when espoused theory and theory-in-use were incompatible (Argyris & Schön, 1974). The desired result of applying the theories was to understand the discrepancy between the two theories and close the gap between stated beliefs and actual actions, thus increasing the effectiveness of our daily actions. The authors suggested that this knowledge, in effect, brought espoused beliefs closer to what others see as our actions.

ROLE OF RESEARCHER

In the qualitative aspects of this study, the researcher was involved in gathering and analyzing data. Merriam (2002) noted this involvement allows the researcher to "maximize opportunities for collecting and producing meaningful information" (p. 20). The researcher was an Instructional Coach for eight years in the school district where the study took place, and had knowledge and experience with programs and interventions in one of the middle school campuses. The researcher also provided coaching to train, help implement, and monitor a research-based program located in the school. The position gave the researcher access to middle school teachers for the pilot. Further, as an Instructional Coach, the researcher had contact with other middle school campuses and teachers. Although the researcher know some of the survey participants, their responses were collected anonymously.

SUMMARY OF CHAPTER

The survey was conducted to examine teachers' knowledge and beliefs about the requirements of NCLB (2001) and the implementation of interventions with students with or without disabilities. The chapter presented the research design, theoretical framework, the development of the on-line survey, and survey procedures. A total of 1,139 middle school teachers, employed within a large, urban school district, were sent the survey. The survey responses were gathered using the software program, Qualtrics® (Qualtrics Lab Inc., 2013). The results of the survey will be discussed in Chapter 4.

Chapter 4: Results

A total of 1,139 surveys were distributed electronically to teachers at 20 middle school campuses in one large central Texas school district. The number of responses received was 403, yielding the return rate of 35%; a rate higher than the average response rate of 24% for email surveys (Sheehan, 2001) and 27% median online survey responses (Hamilton, 2009). Using the Sample Size Calculator (MaCorr Research, 2003-2013), a 95% confidence level was achieved that the response size of this survey was representative of the surveyed population within a ±3.9 confidence interval.

The data were analyzed using information provided by Qualtrics® (Qualtrics Lab Inc., 2013). The on-line survey program calculated the number of responses and corresponding percentages for survey questions that required a yes/no response or when instructions were *click all that apply*. If the survey question used a Likert scale, the Qualtrics® (Qualtrics Lab Inc., 2013) program calculated the number of responses and the mean for each question. The percentages were calculated manually.

Demographics

The middle school teachers who completed the survey provided information about the following: (a) gender, (b) ethnicity, (c) highest level of education, (d) age, and (e) teacher certification (see Table 4.1). Of the teacher respondents, 75% were female and 25% were male. Teacher ethnicity was 61% White, 20% Hispanic, and 11% Black. Regarding the highest attained degree level of participants, 47% held Bachelors, 28%, Masters, and .6% Doctorate. Sixty percent of the teachers had zero to 10 years of

Table: 4.1

Characteristics of Teachers

Characteristics	Number of Responses	Percentage
Gender	(*n* = 403)	
Female	301	75 %
Male	100	25%
Ethnicity	(*n* = 403)	
White	242	61%
Black or African American	45	11%
Hispanic or Latino	81	20%
Asian	14	4%
Other	18	5%
Age	(*n* = 403)	
30 or under	101	25%
31-40 years old	133	34%
41-50 years old	81	20%
51-59 years old	59	20%
59 years or older	23	6%
Highest Education	(*n* = 403)	
Bachelor's Degree	189	47%
Some Graduate Work	77	19%
Master's Degree	111	28%
Advanced Graduate Work	20	5%
Doctoral Degree	3	.6%
Teacher Preparation Program	(*n* = 403)	
Traditional Certificate	230	58%
Alternative Certification	155	30%
Other	12	3%

Table: 4.1 Continued

Characteristics	Number of Responses	Percentage
Years of Teaching	(*n* = 397)	
0 (if first year of teaching)	44	11%
1-4 years	89	22%
5-10 years	110	28%
11-15 years	52	13%
16-20 years	45	11%
21-25 years	26	7%
More than 25 years	31	8%
Teaching Assignment	(*n* = 528)	
General Education	298	75%
Special Education	124	31%
ESL/ Bilingual	65	16%
Other	41	10%
Grade Level	(*n* = 738)	
6th grade	226	57%
7th grade	253	64%
8th grade	259	66%
Content Area	(*n* = 393)	
English Language Arts	71	18%
Mathematics	65	17%
Social Studies	48	12%
Science	66	17%
Reading	13	3%
Other	130	33%

Note. Teachers could check all categories that applied to their current teaching assignment or grade level.

teaching experience. Typically, the participants received their teaching certificates through traditional methods (i.e., 58% through college or university classes). However, 30% of the respondents were awarded alternative route teaching certification.

Teaching Experience

The largest number of respondents had five to 10 years of teaching experience (28%). However, the second largest group (22%) had only one to four years of teaching experience, and 33% had taught four years or less (Table 4.1).

Respondents were asked to characterize their current teaching assignment, what grade they were teaching, and their specific content area. They were given the option to check more than one area of teaching or grade level. The percentage of teachers who selected 6^{th}, 7^{th}, and 8^{th} grade were similar in number. The majority identified their current teaching assignment as general education (75%), followed by special education (31%). (See Table 4.1).

The 130 teachers who did not teach a content area (i.e., mathematics, social studies, language arts, science, and reading) and marked "other" were automatically exited by the online survey. The survey data used to answer the research questions focused on the responses of 263 teachers who taught core content areas of mathematics, science, social studies, language arts, or reading (Table 4.1).

RESEARCH QUESTION #1

What knowledge do middle school teachers have about scientifically based research?

First, teachers ranked their familiarity with the five major components of No Child Left Behind (2001). (See Table 4.2) The choices ranged on a Likert scale of one to four from "not at all familiar" to "very familiar." Slightly more than half of the respondents (56%) were "very familiar" with student assessment and accountability and highly qualified teachers. Slightly less than half of the respondents (49%) were "very familiar" with adequate yearly progress. In addition, only 37% of the teachers were "very familiar" with scientifically based research, and 33% were "very familiar" with parental choice of schools.

Table: 4.2

Five Major Components of No Child Left Behind

Components	Not at all Familiar	Somewhat Familiar	Familiar	Very Familiar	Total
	%	%	%	%	*n*
Highly Qualified Teachers	3%	10%	31%	56%	271
Scientifically Based Research	7%	18%	38%	37%	270
Adequate Yearly Progress	2%	14%	35%	49%	270
Student Assessment and Accountability	3%	8%	33%	56%	271
Parent Choice of Schools	6%	22%	39%	33%	270

Second, teachers were surveyed about their level of knowledge of the seven criteria in the definition found in No Child Left Behind (2001). Although the law established definitive criteria, i.e., necessary or must be present for scientifically based research, teachers determined that each of the seven criteria was "frequently" but not "always" present (Table 4.3).

Thirty-one percent of the teachers identified the first criteria addressing rigorous, systematic, and objective procedures as "always" present. Teachers (28%) indicated that

Table: 4.3

Knowledge of Scientifically Based Research

Scientifically Based Research	Never %	Sometimes %	Frequently %	Always %	Total *n*
Involves the application of rigorous, systematic, and objective procedures to obtain reliable and valid knowledge relevant to education activities and programs.	2%	19%	53%	31%	263
Employs systematic, empirical methods that draw on observation or experiment.	2%	23%	47%	28%	261
Involves rigorous data analyses that are adequate to test the stated hypotheses and justify the general conclusions drawn.	2%	23%	43%	32%	258
Relies on measurements or observational methods that provide reliable and valid data across evaluators and observers, across multiple measurements and observations, and across studies by the same or different investigators.	1%	23%	46%	30%	255
Is evaluated using experimental or quasi-experimental designs.	7%	39%	42%	12%	257

Table 4.3 (Continued)

Knowledge of Scientifically Based Research (continued)

Scientifically Based Research	Never	Sometimes	Frequently	Always	Total
	%	%	%	%	*n*
Ensures that experimental studies are presented in sufficient detail and clarity to allow for replication or, at a minimum, offer the opportunity to build systematically on their findings.	4%	27%	40%	28%	250
Has been accepted by a peer-reviewed journal or approved by a panel of independent experts through a comparably rigorous, objective, and scientific review.	5%	28%	47%	20%	250

the second criteria, addressing systematic, empirical methods was "always" present. Thirty-two percent of the teachers felt that criteria three, involvement of rigorous data analyses was "always" present. While criteria four involving the requirement for multiple studies, teachers (30%) identified as "always" present. The teachers (12%) felt the use of experimental or quasi-experimental designs in criteria five was "always" present, while replication of experimental studies was "always" present according to 28% of the teachers. The last criteria, the teachers (20%) indicated the acceptance of the research in a peer-reviewed journal as "always" present.

The two criteria receiving the lowest percentages were experimental or quasi-experimental designs and accepted by a peer-reviewed journal of panel of experts. None of the criteria for research received a majority rating of "always" present. The response of "frequently" was ranked the highest for all seven criteria indicating the respondents were not completely sure of the criteria required for scientifically based research, a requirement of No Child Left Behind (2001).

RESEARCH QUESTION #2

Where do middle school teachers acquire their knowledge about scientifically based interventions?

Teachers selected from a list of possible resources that provided information about scientifically based interventions. Teachers identified those resources that they used and how often (Table 4.4). The category labeled "all the time" had the fewest number of total responses. Teachers chose "colleagues on my campus" (17%) and "professional development" (16%) as resources they utilized "all the time." Resources teachers utilized "often" were, again, professional development (58%) and colleagues on my campus (50%) with the addition of the Texas Education Agency (40%). The respondents indicated "occasional" access to: U.S.

Department of Education (43%); Texas Education Agency (36%); and peer-reviewed research on specific programs (39%). The three resources that teachers "never" utilized were: Best Evidence Encyclopedia and Campbell Corporation (87%) as well as What Works Clearinghouse (77%).

Three open-ended survey questions asked for more insight into the implementation of scientifically based interventions. Teachers' responses addressed where they learned about specific interventions. One teacher stated, "I went to professional development and felt comfortable with teaching the interventions" or "I was coached through them." Other responses were "recommended by other teachers or at trainings" and "learned in PD and saw how they helped me learn vocab and more clearly understand concepts more quickly." The teachers' written responses support the findings of the survey.

Table: 4.4

Scientifically Based Interventions

Resources	Never %	Occasionally %	Often %	All the Time %	Number of Responses *n*
What Works Clearinghouse	77%	18%	8%	0%	230
Best Evidence Encyclopedia	83%	11%	6%	6%	228
Professional Development	7%	19%	58%	16%	241
U. S. Department of Education	32%	43%	22%	3%	231
National Institute for Literacy	59%	27%	12%	2%	230
Texas Education Agency	16%	36%	40%	8%	241
Peer-reviewed Research on Specific Programs	24%	39%	31%	5%	237
Colleagues on my Campus	8%	25%	50%	17%	241
Campbell Corporation	87%	8%	4%	0%	229
University Websites	43%	32%	21%	4%	234
Institute of Science	73%	15%	11%	1%	227
Other	56%	21%	16%	7%	81

RESEARCH QUESTION #3

How do middle school teachers utilize scientifically based interventions with their students, with or without disabilities, in their schools?

The next three questions focused on where teachers utilized scientifically based interventions with their students. Teachers were asked to identify one or more instructional settings where they used scientifically based interventions with their students (Table 4.5). The choices were: whole classroom instruction, small group instruction, intervention classes, tutoring, or other. Small group instruction (73%) was ranked the highest, closely followed by whole classroom instruction (70%). Intervention classes and tutoring were also identified as frequent places to implement interventions. One teacher used "small group centers in the classroom to work on specific concepts the students are lacking." Another teacher shared, "I teach Read 180, a research-based intervention class. I use it when teaching whole group, small group, and when conducting teacher/student or teacher/parent conferences."

Table: 4.5

Where Interventions Take Place

Instructional Settings	*n* = 659	%
Whole classroom instruction	173	70%
Small group instruction	180	73%
Intervention classes	153	62%
Tutoring	146	59%
Other	7	3%

Teachers reported where and how often they used scientifically based interventions with their students. They were given five different instructional settings (whole group, small group, small groups during class, tutoring during or after school) and four different time frames (never, 2 – 3 times a month, once a week, more than once a week**).** (See Table 4.6) The results indicated that whole group instruction was used most frequently as an intervention, followed by more than once a week for small group instruction. One teacher used "weekly interventions based on MOY 2 and 3 data, aligned to TEKs that were underperformed on." Another teacher stated "Sometimes I wish I had more time to implement them [interventions] in my classroom, but though they are important, they are not always practical with my student population."

Table: 4.6

Intervention Usage

Location/ Time	Never	2 – 3 Times a Month	Once a Week	More than once a Week	Number of responses
	%	%	%	%	*n*
Whole group Instruction	9%	35%	24%	32%	240
Small group Instruction	9%	38%	24%	29%	239
Small groups during class time	14%	34%	26%	27%	237
Tutoring during the school day	28%	34%	19%	20%	235
Tutoring outside the school day	23%	33%	23%	21%	231

Teachers responded to two open-ended questions. The first question asked them to name or give examples of several scientifically based interventions used in their classrooms. The 160 teachers who responded generated a total of 406 responses. The responses were sorted using the intervention definition of educational program, product, practice, or policy aimed at improving student outcome (Institute of Education Sciences, 2013). Using the coding process (Miles & Huberman, 1994; Creswell, 2009) described in the methods section, the responses were grouped into nine categories. Forty-one percent of the responses were grouped as "general strategies" used by teachers in the classroom with reading strategies identified as the largest subcategory (17%). A sample response included "modeling comprehension strategies" or "guided reading." Thirty percent of the responses were grouped as "programs" used with students; the Strategic Instructional Model (SIM) identified as the largest subcategory (20%). Other examples listed were Lexia, READ 180, and Stemscope. The rest of the responses were distributed across 5 different categories: data and testing (7%), English Language Learners' strategies (6%), conferences and books (5%), behavior interventions (2%), and tutoring (2%). Four respondents were not sure what scientifically based interventions were and 10 identified Response to Intervention as an intervention. Fourteen responses did not pertain to the question.

The second open-ended question asked the teachers to identify why they decided to use a specific intervention or interventions. The 169 teachers who responded generated a total of 191 responses. The decision to use an intervention that garnered the most responses (29%) was an administrative decision made at the campus or district level. Sample responses were "mandated by school administration" and "required to use them by the administration." Professional development and information shared by colleagues received the second most frequent responses

(15%). Sample responses about professional development were "tried in a PD and realized they would help students, too" and "good PD explaining them and demonstrating them." Other individual teacher responses were "peer recommendation" and "was suggested by colleagues." These responses were followed by comments that were either teacher focused (18%) or student-focused (18%). Examples of teacher-focused were, "I tried so many, many approaches with my students. Not all interventions work with all students. I use what impacts my student's learning." Another comment was, "They address my needs and the needs of my students." Student-focused comments were "students learned the material and were able to retain," and "they are in the best interest of the students." Thirty-seven responses were distributed across three different categories that included characteristics of interventions (9%), curriculum (5%), and research (4%). Six responses did not directly pertain to the question.

RESEARCH QUESTION #4

What are the beliefs of middle school teachers about the importance of scientifically based interventions?

Teachers were surveyed about their beliefs about the importance of scientifically based research to education as a whole (Table 4.7). Slightly over one-third of the teachers "strongly agreed" (38%) that scientifically based research was important to the field of education. Close to two-thirds of the teachers "agreed" (55%) that scientifically based research was important to the field of education. This difference between "strongly agree" and "agree" of 17%, suggests a wide range of teachers' beliefs about the importance of scientifically based research. A small percentage of teachers did not know what scientifically based research was specifically or felt it only important to either special education (1%) or general education (1%).

Table: 4.7

Beliefs about the Importance of Scientifically Based Research

Importance of Responses	Strongly Disagree %	Disagree %	Agree %	Strongly Agree %	Number *n*
Important to the total field of education	0%	6%	55%	38%	252
Only important to teachers in special education settings	34%	60%	5%	1%	246
Only important to teachers in general education settings	33%	60%	6%	1%	245

The teachers were asked whether scientifically based research was important to them (Table 4.8). Scientifically based research was "very important" to 26% of the teachers. Interestingly, just over a third of the teachers had reported that they were knowledgeable about scientifically based research (Table 4.1); yet only 26% reported it "very important," and "40%" identified it as "important" to them.

Table 4.8

Beliefs about Scientifically Based Research Important Personally to the Teachers

Importance	*n* = 241	%
Not Important	10	4%
Somewhat Important	76	32%
Important	93	40%
Very Important	62	26%

Teachers' confidence level when using an intervention in a specific setting (Table 4.9) was identified using descriptors: not confident, somewhat confident, confident, or very confident. Regarding interventions, teachers reported they were "very confident" during small group (25%) and tutoring (25%). Teachers' confidence levels showed similar results during intervention classes (24%) and whole class instruction (20%). Whole classroom instruction was ranked the lowest overall. Responses suggest when implementing scientifically-based interventions in various settings, two-thirds of the teachers are confident or very confident.

Table: 4.9

Level of Confidence

Location	Not Confident	Somewhat Confident	Confident	Very Confident	Number of Responses
	%	%	%	%	*n*
Whole class instruction	7%	36%	38%	20%	245
Small group instruction	7%	27%	41%	25%	242
Intervention classes	9%	30%	37%	24%	238
Tutoring	6%	30%	39%	25%	236
Other	18%	35%	26%	26%	51

The teachers' beliefs about scientifically based interventions (Table 4.10) showed different levels of agreement or disagreement but a general view of acceptance of the importance

Table: 4.10

Importance of Scientifically Based Interventions to Different Groups

Importance	Strongly disagree	Disagree	Agree	Strongly agree	Number of Responses
	%	%	%	%	*n*
Important for all teachers	0%	5%	52%	43%	248
Only important to researchers	27%	63%	5%	5%	249
Only important to vendors	32%	58%	5%	5%	247
Only important to teachers when working with students with academic difficulties	24%	67%	7%	2%	246
Only important to administrators	28%	63%	6%	3%	248
Only important to policymakers	32%	59%	4%	4%	247

of scientifically based interventions. Teachers "strongly agreed" (43%) that scientifically based interventions were important to all teachers and did not believe scientifically based interventions were only important to researchers (5%), vendors (5%), or for teachers who worked with students with academic difficulties (2%), administrators (3%), or policy makers (4%).

Teacher comments were, "I believe it is helpful to have scientifically based interventions to support your teaching." Another teacher wrote, "As a math/science teacher I believe there is validity in scientifically based intervention but it must be done with fidelity and purpose,

otherwise, it is just another ring in the circus." Other comments included, "When used often, they [interventions] also develop a sense of structure that the students come to expect." And "They [interventions] work, we need more things to engage the kids in learning."

Teachers ranked seven statements regarding how scientifically based interventions have impacted teachers, students, and school campuses (Table 4.11). The first two statements asked if the school's leadership team supported or required the use of scientifically based interventions. Teachers indicated their leadership teams were "always" supportive (35%), and only 24% of the teachers noted that the leadership team required the use of scientifically based interventions. Regarding positive or negative impact on the school's accountability ratings, 40% of the teachers reported interventions positively impacted their accountability ratings with 45% of the teachers reporting that the interventions "frequently" provided a positive impact on the learning of their students. Interestingly, 54% of the teachers stated scientifically based interventions were implemented with fidelity.

The last open-ended question encouraged the teachers to "share or present any comment you wish on how you feel about using scientifically based interventions." The 110 teachers who responded generated 104 viable responses. There were 29% positive, useful comments about scientifically based interventions, but 17% of the comments suggested interventions were not useful or helpful in the classroom. The comment, "It is a way for me to use curriculum/programs that I know have been tried by other professionals; I don't have to reinvent the wheel; and I can tweek them to fit the individual needs of my students," is positive, while "it's great but more often we go with our instincts in the moment for teaching and creating lessons due to the lack of time we have" was not as positive. Responses also addressed the following categories: research (15%), professional development (12%), roadblocks (9%), fidelity of implementation (7%),

Table: 4.11

Use of Scientifically Based Interventions

Use of Scientifically Based Interventions	Never %	Sometimes %	Frequently %	Always %	Number of Responses *n*
Are supported by my school's leadership team	4%	23%	40%	35%	232
Are required by my school's leadership team	7%	31%	37%	24%	232
Have positively impacted my school's accountability ratings	8%	43%	40%	9%	225
Have negatively impacted my school's accountability ratings	57%	32%	9%	2%	220
Are implemented with fidelity on my school campus	10%	54%	31%	5%	224
Have positively impacted the learning of my students	3%	39%	45%	12%	226
Have negatively impacted the learning of my student	59%	35%	7%	0%	222

testing (6%), and student behavior (4%). Teachers' comments about research included "People who research and make policy are rarely in the classroom on a daily basis with kids. Some have never been. Therefore I think this kind of research is biased."

or "there are times when theory to practice are not aligned." In the category of professional development, the comments identified the need for a better understanding of scientifically based interventions. The comments ranged from, "I do not have a clear understanding of what scientifically based interventions are," to "I would like to learn about other scientifically based interventions that I could use in my classroom." Roadblocks included "sometimes beneficial but I think too many programs are introduced without giving previous ones the chance to succeed."

DATA SUMMARY

The survey data suggest middle school teachers were somewhat knowledgeable about scientifically based research and interventions. Their responses to three open-ended questions gave more insight and raised more questions about their actual knowledge and understanding of the implementation of scientifically based interventions

Teachers' knowledge of the five components of scientifically based research was "very familiar" to approximately one-third of the respondents, while knowledge of each of the seven criteria found in the definition of scientifically based research (NCLB, 2001) was "frequently" for approximately the same number of respondents. These findings indicate that teachers need more information about scientifically based research. When accessing resources that had information about scientifically based interventions, teachers relied on professional development and colleagues for information. It is important that teachers learn how to access more resources (i.e., What Works Clearinghouse). Teachers gave no clear picture as to where, when, and how often interventions were implemented with their students. Yet, the findings suggest that teachers

believe in scientifically based research and interventions. The results indicate the espoused beliefs and actions of the teachers are not compatible, and therefore, need to be more connected.

Chapter 5: Discussion

This study examined teachers' knowledge and beliefs about scientifically based research as well as the use of scientifically based interventions in the classroom. The No Child Left Behind Act of 2001 (NCLB) requires the use of scientifically based research to guide the selection of appropriate educational interventions. Interventions backed by rigorous research are to be implemented in schools across the nation to help close the achievement gap between categories of students and create the best educational opportunities for all students (Simpson et al., 2004).

Although NCLB (2001) does not stipulate the use of scientifically based research specific to special education, its provisions influence the education of all children. The implementation of scientifically based research is complex, and relies on the knowledge and beliefs of practitioners in general as well as special education. Teachers' knowledge and beliefs about scientifically based interventions and how to successfully implement them is not clear, particularly in middle schools where students acquire the academic skills needed to complete grade level work in content-area courses.

The majority of middle school teachers who participated in the study were female (75%), white (61%), and under 40 years of age (59%). The demographic data show that 58% of the teachers received their teaching credentials through a traditional teacher preparation and licensure program, and 30% received their teaching certificate through an alternative certification program. The data reveal that 66 teachers (17%) were either "unfamiliar" or "somewhat familiar" with scientifically based research. Forty percent of the teachers identified were novice teachers (i.e., zero to four years of teaching). Twelve teachers (44%) earned traditional teaching certificates, and 15 teachers (56%) went through an alternative certification program suggesting

that teachers' knowledge about scientifically based research was not affected by the training pathway through which they acquired their teaching certificate. As Andrews et al. (2000) indicates, teachers are often not taught the scientific method in their professional training and do not establish a belief or reliance on research-based practices. This study supports research which indicates a lack of training and knowledge of scientifically based research and how scientifically based interventions can be used in their teaching of students.

The data from the survey suggests that both in and outside the classroom, the tendency to state one set of beliefs and demonstrate a different set of actions exists. The espoused beliefs and theory-in-use framework of Argyris and Schön (1974) provides a means of interpreting this discrepancy.

MIDDLE SCHOOL TEACHERS' KNOWLEDGE OF SCIENTIFICALLY BASED RESEARCH

In order for teachers to understand the importance of scientifically based research, they need to have an in-depth understanding of the law (NCLB, 2001) and the "gold" standard of scientific research. NCLB (2001), the Council for Exceptional Children (CEC, 2008) and the Institute of Education Sciences (IES, 2013) have developed guidelines for determining evidence-based research (Kretlow & Blatz, 2011).

Although the National Research Council (NRC) guidelines dovetail with NCLB (2001), there are questions as to which research practices are most beneficial for students, especially students with disabilities. NCLB's (2001) espoused theory is to meet the needs of all students by identifying research-based interventions that will work. However, controversy surrounds some research models; for example, there is a belief among special education researchers that single subject designs are acceptable and add to the field of research-based interventions. This methodology appears to contradict the "gold" standard of having random assignment of

participants to groups. However, in recent years, standards of practice for single subject design have been provided in the WWC as well as in a special series on different methodologies in *Exceptional Children* (2005). Both NCLB (2001) and the National Research Council espouse the belief that research should match the research question, yet each group wants to identify methodology that meets their specific criteria. The mandates for scientifically based research set by NCLB (2001) are clearly stated and are expected to be followed with fidelity.

This study indicates teachers felt they were familiar or very familiar with the five major components (Table 4.1) of NCLB (2001). However, their responses indicate scientifically based research was ranked low in terms of knowledge. Only 38% of the respondents felt they were "very familiar" with scientifically based research. However, when the percentages of teachers, who felt they were "familiar" or "very familiar," are combined, 75% of the teachers indicate they are knowledgeable about scientifically based research. Additionally, the data suggest that teachers possess some knowledge of the seven specific criteria found in the definition of scientifically based research (NCLB, 2001). (See Table 4.2) The responses indicate that less than one-third of the respondents understood that all seven criteria are necessary to meet the "gold" standard of research. In addition, the responses indicate teachers were the least knowledgeable about two components: experimental or quasi-experimental designs and research accepted by a peer-reviewed journal by a panel of experts.

Greenwood and Maheady (2001) argue that the role of teacher educators is to foster the attitude that teaching is based on scientific principles, that research has a place in classroom instruction, and that teachers can help address the research-to-practice gap that continues to exist in education by using such methods. As stated by Landrum et al. (2002), only when the "teachers learn about empirically sound practice in both their initial preparation and ongoing professional

development, and that their skills reflect this training, can we predict that students with disabilities will be afforded the most appropriate learning opportunities available" (p. 48). At the same time, teachers need to be able to draw from research findings that are presented in a user-friendly format that is assessable, practical, meaningful, reliable, and accurate (Cook, Tankersley, et al., 2008). One study participant's response was, "The research involved in scientifically based interventions encourages me to use it more often in my classroom." However, other teacher comments were not as positive. For example, "Too many things happen in a classroom that are in-the-moment and unplanned such that scientifically based research cannot capture these moments." Another respondent wrote, "Research can be conducted to prove almost anything. Corporate interest drives research. Corporate interest corrupts education."

These findings suggest that teachers believe they understand scientifically based research, one of the components of NCLB (2001). However, the data also indicate they need more information about the criteria used to identify scientifically based research. The teacher comments also suggest teachers have a range of espoused beliefs about scientifically based research. These beliefs can drive their actions in the classroom.

ACQUISITION OF KNOWLEDGE ABOUT SCIENTIFICALLY BASED INTERVENTIONS

There is a paucity of research on how and from where teachers acquire the information that influence their classroom practices (Landrum et al., 2002). This study helps address this lack of information. The data of this study indicate that the top three resources teachers use "often" or "all the time" to acquire scientifically based interventions were: professional development, colleagues on my campus, and the State Education Agency, in this case the Texas Education Agency. The resources selected are easily accessible on a school campus. The data point out that most middle school teachers do not typically access academic or government sites to get

information about specific interventions. These data agree with other research. According to Carnine (1995), teachers' beliefs about research findings are based on whether the research findings are trustworthy, usable, and accessible.

A study by Landrum et al. (2002), using Carnine's (1995) framework, identifies where teachers acquire their knowledge about teaching: other teachers, workshops, college courses, or journals. Teachers rank colleagues and workshops higher than college courses or journals (Landrum et al., 2002). In this study, teachers (74%) chose professional development "often" or "all the time" as the first place to acquire knowledge about scientifically based interventions. The second resource teachers (57%) selected was "colleagues on my campus." In contrast, 36% of teachers utilized peer-reviewed research on specific programs, while university websites were accessed by 24% of the teachers. One teacher's written response was, "I appreciate the summed up 'white papers' that extract the sentient facts, so that we, who are in the classroom, do not have to go through reams of words to get what we need."

Stipek and Byler, (1997) posit that one way to create changes in educational practices is to address the goals and beliefs of the teachers through professional development. Issues arise when teachers talk about their professional ability to identify the specific interventions that individual students need to be successful without adequate training in research-based practices (Snider & Roehl, 2007). Boardman and colleagues (2005) suggest that teachers are looking for appropriate programs and professional development support, not research-based programs. In this study, one teacher's written response was, "I try so many, many approaches with my students. Not all interventions work with all students. I use what impacts my student's learning." If research-based interventions stifle the instructional freedom of teachers, which some teachers espouse to be their professional right, professional wisdom will not be enough

(Cook et al., 2008; Snider & Roehl, 2007). One teacher shared the following opinion about scientifically based interventions.

> Children vary from child to child and from moment to moment. Allowing a professional teacher to be flexible enough to take advantage of "teachable moments" is critical to success. The last few years, we have lost this flexibility and our children are suffering as we focus on their "data" instead of their love of learning. In fact, the current system feels designed to make all concerned detest learning!

The study indicates teachers do not access online resources that would help them identify a new practice or program that met the criteria of No Child Left Behind (2001). Teachers also do not have free access to peer-reviewed research on specific programs, such as research journals and databases which would be available through university libraries (Kretlow & Blatz, 2011). Even if information may or may not be easily accessible, the National Center for Education Statistics (2005) reports 99% of the teachers has access to the internet on a daily basis. But, Kretlow and Blatz (2011) suggest that teachers need help in understanding the focus and structure of the online resources (i.e., What Works Clearinghouse; Best Evidence Encyclopedia, etc.). The findings in this study indicate that 8% of the teachers have accessed What Works Clearinghouse, and 23% of the teachers have accessed the U. S. Department of Education, two examples of online resources that furnish information about scientifically based interventions. Understanding how to access the websites for information about evidence-based practices gives the teachers “a basic understanding of how each site determines evidence in order to make the most informed decision when selecting a program practice, or strategy to use with students.” (Kretlow & Blatz, 2011, p. 11).

Snider and Roehl (2007) emphasize similar concerns in classroom and professional issues. The authors discuss how student learning is affected by teachers' beliefs and the ability to identify and use effective instructional practices in the classroom. Traditionally, teachers rely on their personal experiences, colleagues, and individual teacher interpretation to discern what works in their classroom (Boardman et al., 2005; Cook & Cook, 2011; Slavin, 2008) – a practice that make educators and teachers, who present professional development and workshops, believable and an accessible source of information (Landrum et al., 2002). When this study asked about scientifically based interventions, one teacher's written response was, "the biggest issue I see is either the explanations for interventions not being adequately shared/explained, or too many implemented in rapid fire not giving any of them time to work." Carnine (2000) states that too often schools have used programs and practices based on fads and personal bias. Educators must be able to understand the difference between science, fads, experts, and entrepreneurs in order to ensure that evidence-based practices or treatments exist in the classrooms (Yell et al., 2005). Not understanding the difference between research-based interventions and personal experience contributes to the research-to-gap phenomenon that exits in education (Carnine, 1995). One response gives insight into how one teacher felt about scientifically based interventions. The teacher wrote, "People who research and make policy are rarely in the classroom on a daily basis with kids. Some have never been. Therefore I think this kind of research is biased."

Klingner et al. (2003) suggests ways that researchers may help accomplish this task. They propose actively involving teachers in the research and implementation of new programs, demonstrating the value of the practice, providing materials, and acting as mentors and so forth. Professional trainers can model and teach practitioners to discriminate between proven and

unproven educational methods and strategies (Simpson et al., 2004). Both trainers and professionals in training must also know the difference between testimonial and empirical evidence (Yell et al., 2005).

Although teachers may espouse that scientifically based interventions are important, their actions show that they primarily only use professional development and colleagues as a source of information about scientifically based interventions rather than seeking other outlets for pertinent information. Teachers need more information about the array of internet resources, which could furnish information on how to select scientifically based interventions.

UTILIZATION OF SCIENTIFICALLY BASED INTERVENTIONS

The actual work of NCLB (2001) and scientifically based research happens on the school campus and in the classroom. The beliefs of teachers and their selection and procedures for implementation of interventions must be connected for success of research-based practices. The survey questions pertaining to utilizing scientifically based interventions with all students ask the teachers to identify the educational setting where interventions were used and how often they used the interventions. The findings indicate that 73% of the teachers utilize small group instruction, followed by 70% of the teachers using whole group instruction. Intervention classes were used by 62% of the teachers and 59% of the teachers utilized tutoring. Because the survey was completed by teachers who taught core classes, fewer teachers selected intervention classes for implementing scientifically based interventions. However, all core teachers could utilize tutoring to help struggling students, especially student with learning disabilities. One teacher's comment was, "I wish we had more professional development on best practices targeted for our interventions. I also wish there was class time set aside for interventions (not depending on students to show up after school as this often does not happen)."

Next, the results indicate how often teachers used scientifically based instruction and their level of confidence. The survey results establish no clear picture of when scientifically based interventions were used or how often they were used. The overall responses indicate that interventions were used in various academic settings and at various times with no clear pattern of consistent usage, suggesting random or uninformed usage of scientifically based interventions.

Although teachers' actions imply they are using scientifically based interventions, less than one-third of the teachers implemented interventions more than once a week. Similar percentages of teachers utilized interventions once a week or two to three times a month. Tutoring during the school day or outside the school day was utilized the least by the teachers, a place where struggling students would benefit from small group instruction. The findings show that teachers' beliefs about scientifically based interventions are not clearly demonstrated through their actions. One teacher's response was:

> Setting the expectations to seek out and use research based interventions/strategies is a need at district as well as campus level. In my particular district we latch on to the latest and greatest without sharing with teachers the research behind the methods. This often prevents those methods from being used with fidelity or confidence.

Teachers have a long list of reasons why implementing research-based programs in the classroom is difficult. Lack of time has been stated most often, in addition to inadequate support from the administration, high stake testing, insufficient materials, mismatch between style and practice, and district mandated programs (Klingner et al., 2003; Kretlow & Blatz, 2001). One teacher's response in this study supports these concerns. The comment concerning scientifically based interventions was, "It's great but more often we go with our instincts in the moment for

teaching and creating lessons due to the lack of time we have." These resistances to using scientifically based interventions are possibly expected reactions from teachers, considering their skepticism of research and the revolving door of research-based practices (Boardman et al., 2005).

Klingner et al. (2003) state one barrier to successfully implementing a classroom intervention is meeting the academic needs of all students, making it difficult to follow a structured program with fidelity. Teachers may also have low expectations of their students, blaming the lack of progress on student motivation (Snider & Roehl, 2007). This is reflected in a written comment made by a teacher in this study:

> Each child is different but it seems more and more students are needing some type of intervention. I think that we do what we can, within our school walls, but it is going to be extremely difficult, for students to succeed, until the home dynamics change. When the value of an education and the importance of it within the home changes, the environment with the school with change.

Other concerns are that teachers have a tendency to adapt or structure programs to meet their own needs or what they construed as the needs of their students, making it difficult to know whether a program is successful or not (Baker et al., 2004; Datnow & Castellano, 2000; Klingner et al., 2003). However, one written response indicated that scientifically based interventions "All seemed feasible and applicable to my general ed classroom and having a background in SPED, the more learning styles I can reach with different interventions, the better the entire class can learn. Not just SPED students need reteaching!"

Special educators do not routinely utilize research-based teaching strategies in the classroom because effective interventions for students with disabilities are determined on an individual basis (Landrum et al., 2007; Cook et al., 2008). Therefore it is important for teachers to see concrete examples of how scientifically based interventions relate to their students and their specific classroom situations (Klingner et al., 2003). The notion that instruction for students with disabilities is based on individual need makes it difficult for teachers to perceive such procedures as beneficial for a whole classroom. If teachers sense no direct effect from what they are asked to do, there is no change in their actions (Klingner et al., 2003). Teachers can help in the identification of quality interventions if they use their professional expertise to utilize practices that improve student teaching (Cook et al., 2008). However, general comments made by teachers in this study indicate they are concerned about the individual needs of all students. One teacher shared, "I think that students need to be met where they are coming from." Another wrote, "I try different things until I find something that works for a particular situation and student."

Traditional schools and many current teaching practices are full of Model 1 espoused beliefs and Model 2 theory-in-use actions (Argyris & Schön, 1974). Schools typically state that the education of all students is the highest priority, yet when examining the infrastructure it becomes apparent that the beliefs teachers have about interventions have a direct influence on how scientifically based interventions are implemented in the classroom.

WHY TEACHERS CHOSE SPECIFIC INTERVENTIONS IN THEIR CLASSROOMS

The data of this study indicate that the most frequent reason for the use of scientifically based interventions was they were mandated by the school district or the campus administration.

One study participant's written response was, "It is required that I use interventions with struggling students." Another wrote, "Our school has decided on these interventions." A third comment was, "It is curriculum provided by the district." The second reason why teachers decided to implement scientifically based interventions was professional development and colleagues. One teacher shared, "I went to professional development and felt comfortable with teaching the interventions or I was coached through them." Another comment was that interventions were "recommended by other teachers or at trainings." Additional written responses were, "I chose those specific interventions because they worked for all my students," and "Because they have results of learning gains with the population of students I work with."

The gap between research and practice continues to exist, and attempts to impose changes over time have largely been unsuccessful (Abbott et al., 1999; Datnow & Castellano, 2000, Landrum et al., 2007). The selection of concise and measurable interventions that ensure increased student learning and the implementation of those identified interventions are dependent upon the classroom teachers' espoused beliefs (Model 1) and theory-in-use actions (Model 2) being compatible and consistent.

TEACHERS' BELIEFS

In this study, thirty-eight percent of the teachers indicate they "strongly agreed" that scientifically based research was important to the field of education, and 26% of the teachers identified it was "very important" to them personally. However, only approximately one-fourth of the respondents were "very confident" in implementing scientifically based interventions, suggesting that teachers as a whole need more support in implementing scientifically based research and interventions. Richardson and colleagues (1991) state that "unless teachers' beliefs

are congruent with the theoretical assumptions of the practice" (p. 579), change may lead to frustration.

The fourth research question examined teachers' beliefs of the importance of scientifically based interventions to teachers. The results indicate 43% of the teachers identified scientifically based interventions as important to all teachers, not just researchers or teachers who work with students with academic difficulties. Forty percent of the teachers felt that scientifically based interventions were "frequently" supported by their leadership team. However, more than a third of the teachers (37%) felt scientifically based interventions were "frequently" required by the leadership team. However, interventions were implemented with fidelity only slightly more than only one-third of the time. Yet, teachers indicate that the interventions positively impacted the learning of their students. The teachers also indicated that scientifically based interventions positively impacted school accountability ratings. The data indicate that while the teachers understand the importance of scientifically based interventions, they are not sure implementing them will be effective with students.

If the educational improvement processes continues to ignore teacher beliefs when implementing change, disappointing outcomes continue when using evidence-based practices (Richardson et al., 1991). Change does not come quickly or easily to an educational system built on single-loop practices. Teachers are known to agree with an instructional strategy, such as collaborative learning, espousing use of the strategy in their classrooms. Yet, when no one is paying attention, they revert back to a different teaching style, such as directed learning. Such action mirrors what Argyris & Schön's (1974) identify as theory-in-action behavior in organizations.

Although the literature examining these areas over twenty years, the same issues of teacher actions and evidence-based practices continue. The fidelity of implementation and the sustainability of an intervention lie in the hands of the practitioner, i.e., the teacher. Richardson et al. (1991) state that constructive change happens only when teachers reflect on what is happening in their classrooms and understand how the use of other frameworks, such as evidence-based practices, can enhance both teacher and student knowledge. The end product is the need to incorporate scientifically based guidelines as information in the decision-making process which must include teachers. Selecting teaching strategies and programs that will work with all students, including students with disabilities, must provide teachers with knowledge and input into the selection. The responsibility is at the school level, at each individual campus, and ultimately, with the classroom teacher.

Compatible espoused and theory-in-use actions of the teachers are necessary to make a difference. Teachers must be able to: (a) see the value in scientifically based research, (b) be willing to learn what research is important, (c) be involved in selecting interventions, (d) implement the interventions with fidelity, and (e) expect improvement to occur. Selection of concise and measurable interventions that ensure increased student learning are dependent upon the classroom teacher becoming a part of the research community, translating scientifically based research to the school campus. In other words, double-loop learning becomes a process at the school and classroom levels.

TEACHERS' COMMENTS ABOUT USING SCIENTIFICALLY BASED INTERVENTIONS

The comments range from "I believe scientifically based interventions has helped many of my students who are struggling learners," to "I really am not sure what scientifically based

interventions are." Such a range of teacher comments reflect the difficulty of bringing espoused and action into compatibility. Another teacher has stated the dilemma:

> The major reservation I have with "scientifically based" interventions is this notion that they WILL work for all students most of the time. I question what "working" looks like to certain researchers and the measures they've used to determine whether or not a method is/is not effective. A small research study that has not been replicated and that may have been done with a very select group of students in a specific context often gets picked up by curriculum writers and ed policy professionals as "the solution"--which then gets mandated into institutions, creating a problematic assumption that if teachers "do this" then they WILL see results. There are so many intersecting relationships within any particular district, school, and classroom that impact student achievement that it is naive to believe "this" or "that" "scientifically based" intervention will work anywhere it is implemented.

If sustainability is to be obtained, teachers need training in innovations and support for their efforts over time. The long-standing gap between research knowledge and special education practice (Abbott et al., 1999; Landrum et al., 2007) describes the mismatch of needs of the practitioner in the classroom and interventions suggested by the research community.

Part of the responsibilities of research institutions and researchers is to support the implementation of new interventions, recruit schools and teachers who will participate in research projects, match the research to the needs of the school, and give consistent mentoring and feedback (Klingner et al., 2003). The lack of understanding of an intervention or its benefit for students can be addressed through professional development (Klingner et al., 2003).

Klingner, Boardman, and McMaster (2013) state that early in the research process, researchers should work with school district partners, meet district needs, and be responsive to local conceptual factors because the sustainability of interventions can be affected by competing priorities, changing demands, and teacher/administration turnover.

LIMITATIONS AND RECOMMENDATIONS

There are a number of limitations to this study. First, the study is exploratory in nature to determine what teachers know and believe about scientifically based research and interventions. There are also limitations to self reported data. Although the responses were anonymous, the accuracy of the reported data cannot be determined. Further, self selected participation may not be reflective of the opinions of those who chose not to complete the survey. The sample population is limited to middle school teachers in one large school district, indicating additional studies are needed for the results to be generalized to other groups and grade levels of teachers.

A study at both the middle school level and high school level which included classroom observation could provide insight into what scientifically based interventions are actually used at the secondary level. By surveying only one district, there is the potential for response bias when answering the short answer question, "Name or give examples of several scientifically based interventions you have used in your classroom." School districts have a list of suggested programs and strategies teacher learn about during district and campus professional development or through discussions with their colleagues. However, broad knowledge of innovations may not exist. In addition, local universities and education service centers could expand research and disseminate the results on the use of specific interventions or strategies specific for middle school campuses.

The subtle, but important, differences in the definitions of scientifically- based, evidence-based, and evidence-based practices are not clearly explained in the literature. The use of the terminology "scientifically based research" is one description of methods used to test instructional practices (Kretlow & Blatz, 2011). Using the terminology of "scientifically based interventions," the teachers' responses may have been influenced by confusion with the terms "research-based practices" and "evidence-based practices." Teachers need to "understand the difference between scientifically-based, research-based, and evidence-based" (p. 10) as these terms are often used interchangeably during professional development, journal articles, and casual conversations with colleagues (Kretlow & Blatz, 2011).

Further research is needed to examine the connections and linkages between professional practitioners' practices, scientifically based research, school leadership, and teachers' knowledge and beliefs as applied to students with disabilities. In addition, there is an urgency to investigate the relationship between general education and special education for compatibility of espoused and theories-in-action. For example, students with high-incidence disabilities spend a substantial amount of time in the general education classroom. The evidence-based practices for the general education classroom must be compatible with the interventions selected for individual students with disabilities. Change is difficult and more research is needed on how to facilitate a smooth transition for scientifically based practices into the classroom setting. To create agreement between espoused and theory-in-action, the research community must involve the practitioners in the research that directly affects their students.

IMPLICATIONS FOR PRACTICE

Guskey (1988) proposes the need for strong professional development and leadership when implementing an instructional innovation. Successful change efforts need to focus on long

term support for teachers and include them as collaborators in the process of intervention selection and its implementation. The major conclusions of this study support the following needs:

- expand research focused on teacher beliefs and the impact these beliefs have in the classroom;
- teacher preparation programs that include in the curriculum teachers the importance of scientifically based research and how to implement scientifically based interventions with fidelity;
- researchers who build a relationship with teachers and involve them in the research process so that they learn to trust research and the value of research;
- teachers who are more knowledgeable about scientifically based research and interventions;
- teachers that are savvy consumers of research, have access to good professional development, and support from researchers, coaches, mentors, and administration on their school campuses;
- joint professional development for both general and special educators in what comprises effective scientifically based interventions for all students; and
- school leadership that is knowledgeable of scientifically based interventions and supportive of including interventions in school instructional practices.

The results of the study were provided to the school district to inform them of:

- teachers' knowledge and beliefs about scientifically based interventions;
- teachers' selection and use of scientifically based interventions; and

- areas of professional development needed to enhance the use of scientifically based interventions.

ADVICE TO THE PROFESSION TO ADDRESS CHALLENGES

As an educator with 40 years of experience working on school campuses, my professional advice to both teachers and administrators is:

- provide training for all staff members on the importance of scientifically based research and how to identify interventions;
- select interventions as a campus to ensure teacher support;
- make a campus commitment to implement the interventions with fidelity;
- understand that sustainability of interventions is crucial to student learning;
- acknowledge that it takes time to train teachers to implement interventions;
- provide continuous support through professional development and coaching;
- provide time to meet with colleagues to discuss successes and failures; and
- collect data so that teachers can determine if the interventions are increasing student learning.

CONCLUSIONS

NCLB (2001) stipulates that schools implement products and programs based on scientifically based research and requires state departments, school administrators, principals and teachers to collaborate to ensure research-based practices are used with all students (Yell at al., 2005). Simpson et al. (2003) recommend that decisions regarding scientifically based research be made at the local level by professionals who: (a) are knowledgeable, (b) have accurate information regarding student characteristics and circumstances particular to their school, and (c) can create the conditions necessary to derive the expected results. One such condition is that the

espoused beliefs of all of the professionals must match their observable behaviors in order to maximize academic growth. Implementation of these recommendations places responsibility for scientifically based research and site-based interventions with campus administrators as well as general and special education classroom teachers.

This study supports other literature which has concluded that instructional practices based on scientifically based research only work in the classroom if teachers have the necessary training, skills, time, materials, and support from the administration (Browder & Cooper-Duffy, 2003). High quality professional development, goal-oriented and ongoing, must provide teachers and educators with a stockpile of effective practices and the skills to implement research-based interventions (Simpson et al., 2004).

After scientifically based practices are implemented on the school level, there is a need for continuous feedback related to these practices and the effect for students in individual classrooms. Together, researchers and educators need to create and implement policies and procedures that continuously evaluate student growth and produce outcome data (Snell, 2003). Only through this collaboration between researchers and teachers, fully supported by the campus administration, can interventions prove to be effective and produce positive outcomes (Browder & Cooper-Duffy, 2003; Klingner et al., 2003) and congruence be developed between espoused and theory in action.

In addition to strong professional development, teachers and other educators must access and utilize appropriate professional literature when working with students with disabilities. Teachers must become critical evaluators of educational products and access impartial resources that examine and evaluate educational products and strategies. Teachers must learn how to collect data and network with other educators and professional organizations to build a

knowledge base of effective interventions that meet scientifically based research guidelines (Simpson et al., 2004)

Gersten et al., (2000) suggest the best strategy for improving accessibility to effective instructional methods and programs for individuals with disabilities is through research. Appropriate application of scientifically based research can assist in addressing significant questions and gathering data on interventions that equip teachers and parents to help children learn (Simpson, 2005). One goal of NCLB was to shift educational practice from a system in which schools were regulated and evaluated by bureaucratic policies, to schools' receiving resources that were regulated, evaluated, and legitimized by student achievement results (Simpson et al., 2004). This study suggests that achieving such a goal is possible, difficult, and needing significant organizational efforts to be obtained. In order to make strides in closing the achievement gap, it is incumbent upon the researchers, administrators and teachers to work in collaboration, to embrace and utilize scientifically based interventions, and to insure the academic success of all students with or without disabilities.

Appendix A

Copy of Survey

Copy of Survey

Scientific-Based Research

Teachers ultimately select and implement interventions for students. How teachers do so is not well understood. You are invited to be a part of a study that examines how teachers select and implement interventions in their classrooms. Your participation is important because you are a teacher with a good understanding of what students need to know to be academically successful. Your individual responses are recorded anonymously and will not be connected to your email address; none of your responses will affect your position or relationship with AISD. If you agree to be part of the research study, your participation is voluntary and your responses will be anonymous. You may change your mind and stop at any time. You may choose to not answer an individual question or you may skip any section of the survey. Simply click "Next" at the bottom of the survey page to move to the next question. The potential risk to you is no greater than everyday life. The survey should take approximately 15 minutes to complete. There are two sections: 1) general demographics and 2) teacher knowledge and beliefs. The last question provides you an opportunity to share information not included in the questions. If you have questions or concerns, please feel free to contact me, Mary Bach, at mbach@utexas.edu. This study has been processed by The University of Texas at Austin Office of Research Support and the study number is [2013-10-0071]. If you have questions about your rights or are dissatisfied with any of this study, you may contact, anonymously if you wish, the Office of Research Support by phone at (512) 471-8871 or email at orsc@uts.cc.utexas.edu. Thank you in advance for your participation.

In appreciation,
Mary Bach, M.Ed.
Doctoral Candidate Special Education Administration
The University of Texas at Austin

I agree to respond to this survey.

- ❍ Yes (1)
- ❍ No (2)

Answer If I agree to respond to this survey. No Is Selected

1A Please reconsider. Your expertise is valuable and your opinions are very important for this survey.

- ❍ Yes (1)
- ❍ No (2)

If No Is Selected, Then Skip To End of Survey

2 Part I : Demographics You are:
- ❍ Female (1)
- ❍ Male (2)

3 You are:
- ❍ White (1)
- ❍ Black or African American (2)
- ❍ Hispanic or Latino (3)
- ❍ Asian (4)
- ❍ Other (5) _____

4 What level of education have you completed?
- ❍ Bachelor's Degree (1)
- ❍ Some Graduate Work (2)
- ❍ Master's Degree (3)
- ❍ Advanced Graduate Work (4)
- ❍ Doctoral Degree (5)

5 What was your teacher preparation program?
- ❍ Traditional Certificate (1)
- ❍ Alternative Certification Program (2)
- ❍ Other (3) _____

6 What is your age?
- ❍ 30 or under (1)
- ❍ 31 - 40 years old (2)
- ❍ 41 - 50 years old (3)
- ❍ 51 - 58 years old (4)
- ❍ 59 years or older (5)

7 How many years have you taught?
- ❍ 0 (if first year of teaching) (1)
- ❍ 1 - 4 years (2)
- ❍ 5 - 10 years (3)
- ❍ 11 - 15 years (4)
- ❍ 16 - 20 years (5)
- ❍ 21 - 25 years (6)
- ❍ More than 25 years (7)

8 How would you characterize your current teaching assignment? Click ALL that apply.

- ❑ General Education (1)
- ❑ Special Education (2)
- ❑ ESL/ Bilingual (3)
- ❑ Other (4)

9 What grade/ grades are you currently teaching? Click ALL that apply.

- ❑ 6 (1)
- ❑ 7 (2)
- ❑ 8 (3)

10 What content area are you currently teaching?

- ❍ English Language Arts (1)
- ❍ Mathematics (2)
- ❍ Social Studies (3)
- ❍ Science (4)
- ❍ Reading (5)
- ❍ Other (6) _____

If Other Is Not Empty, Then Skip To End of Survey

11 The federal government has an educational law called No Child Left Behind. Below are some of the major components of this law. Rate your familiarity with each component.

	Not Familiar at All (1)	Somewhat Familiar (2)	Familiar (3)	Very Familiar (4)
Highly Qualified Teachers (1)	❍	❍	❍	❍
Scientifically Based Research (2)	❍	❍	❍	❍
Adequate Yearly Progress (3)	❍	❍	❍	❍
Student Assessment and Accountability (4)	❍	❍	❍	❍
Parental Choice of Schools (5)	❍	❍	❍	❍

12 Using a 1 to 4 point scale rate the following statement.

	Never (1) (1)	Sometimes (2) (2)	Frequently (3) (3)	Always (4) (4)
Scientifically based research involves the application of rigorous, systematic, and objective procedures to obtain reliable and valid knowledge relevant to education activities and programs. (1)	❍	❍	❍	❍

13 Using a 1 to 4 point scale rate the following statement.

	Never (1) (1)	Sometimes (2) (2)	Frequently (3) (3)	Always (4) (4)
Scientifically based research employs systematic, empirical methods that draw on observation or experiment. (1)	❍	❍	❍	❍

14 Using a 1 to 4 point scale rate the following statement.

	Never (1) (1)	Sometimes (2) (2)	Frequently (3) (3)	Always (4) (4)
Scientifically based research involves rigorous data analyses that are adequate to test the stated hypotheses and justify the general conclusions drawn. (1)	❍	❍	❍	❍

15 Using a 1 to 4 point scale rate the following statement.

	Never (1) (1)	Sometimes (2) (2)	Frequently (3) (3)	Always (4) (4)
Scientifically based research relies on measurements or observational methods that provide reliable and valid data across evaluators and observers, across multiple measurements and observations, and across studies by the same or different investigators. (1)	❍	❍	❍	❍

16 Using a 1 to 4 point scale rate the following statement.

	Never (1) (1)	Sometimes (2) (2)	Frequently (3) (3)	Always (4) (4)
Scientifically based research is evaluated using experimental or quasi-experimental designs. (1)	❍	❍	❍	❍

17 Using a 1 to 4 point scale rate the following statement.

	Never (1) (1)	Sometimes (2) (2)	Frequently (3) (3)	Always (4) (4)
Scientifically based research ensures that experimental studies are presented in sufficient detail and clarity to allow for replication or, at a minimum, offer the opportunity to build systematically on their findings. (1)	❍	❍	❍	❍

18 Using a 1 to 4 point scale rate the following statement.

	Never (1) (1)	Sometimes (2) (2)	Frequently (3) (3)	Always (4) (4)
Scientifically based research has been accepted by a peer-reviewed journal or approved by a panel of independent experts through a comparably rigorous, objective, and scientific review. (1)	❍	❍	❍	❍

19 Scientifically based research is:

	Strongly Disagree (1)	Disagree (2)	Agree (3)	Strongly Agree (4)
important to the total field of education. (1)	❍	❍	❍	❍
only important to teachers in special education settings. (2)	❍	❍	❍	❍
only important to teachers in general education settings. (3)	❍	❍	❍	❍

20 Knowledge of scientifically based interventions is:

	Strongly Disagree (1)	Disagree (2)	Agree (3)	Strongly Agree (4)
important for all teachers (1)	❍	❍	❍	❍
only important to researchers (2)	❍	❍	❍	❍
only important to vendors (3)	❍	❍	❍	❍
only important to teachers when working with students with academic difficulties (4)	❍	❍	❍	❍
only important to Administrators (5)	❍	❍	❍	❍
only important to policy makers (6)	❍	❍	❍	❍

21 Where do you get your knowledge when selecting scientifically based interventions?

	Never (1)	Occasionally (2)	Often (3)	All the Time (4)
What Works Clearing House (1)	❍	❍	❍	❍
Best Evidence Encyclopedia (2)	❍	❍	❍	❍
Professional Development (3)	❍	❍	❍	❍
U. S. Department of Education (4)	❍	❍	❍	❍
National Institute for Literacy (5)	❍	❍	❍	❍
Texas Education Agency (6)	❍	❍	❍	❍
Peer reviewed research on specific programs (7)	❍	❍	❍	❍
Colleagues on my campus (8)	❍	❍	❍	❍
Campbell Corporation (9)	❍	❍	❍	❍
University Websites (10)	❍	❍	❍	❍
Other (11)	❍	❍	❍	❍
Institute of Science (12)	❍	❍	❍	❍

22 Where do you use scientifically based interventions the most? Click ALL that apply.

- ❑ Whole classroom instruction (1)
- ❑ Small group instruction (2)
- ❑ Intervention classes (3)
- ❑ Tutoring (4)
- ❑ Other (6) _____

23 How often do you use scientifically based interventions with your students?

	Never (1)	2 - 3 Times a Month (2)	Once a Week (3)	More than Once a Week (4)
Whole group instruction (1)	❍	❍	❍	❍
Small group instruction (2)	❍	❍	❍	❍
Small groups during class time (3)	❍	❍	❍	❍
Tutoring during the school day (4)	❍	❍	❍	❍
Tutoring outside the school day (5)	❍	❍	❍	❍

24 How confident do you feel when implementing scientifically based interventions?

	Not Confident (1)	Somewhat Confident (2)	Confident (3)	Very Confident (4)
Whole class instruction (1)	❍	❍	❍	❍
Small group instruction (2)	❍	❍	❍	❍
Intervention classes (3)	❍	❍	❍	❍
Tutoring (4)	❍	❍	❍	❍
Other (6)	❍	❍	❍	❍

25 Name or give examples of several scientifically based interventions you have used in your classroom.

26 Why did you decide to use these specific interventions?

27 Using a 1 to 4 point scale to rate the following statements. The use of scientifically based interventions

	Never (1) (1)	Sometimes (2) (2)	Frequently (3) (3)	Always (4) (4)
are supported by my school's leadership team. (1)	❍	❍	❍	❍
are required by my school's leadership team. (2)	❍	❍	❍	❍
have positively impacted my school accountability ratings. (3)	❍	❍	❍	❍
have negatively impacted my school accountability ratings. (4)	❍	❍	❍	❍
are implemented with fidelity on my school campus. (5)	❍	❍	❍	❍
have positively impacted the learning of my students. (6)	❍	❍	❍	❍
have negatively impacted the learning of my students. (7)	❍	❍	❍	❍

28 How important is scientifically based research to you as a teacher?

- ❑ Not Important (1)
- ❑ Somewhat Important (2)
- ❑ Important (3)
- ❑ Very Important (4)

29 Share or present any comment you wish on how you feel about using scientifically based interventions in your classroom.

30 If you want to be included in the drawing, please provide your email address:

31 Thank you for your participation.

Appendix B

Letter of Invitation

Letter of Invitation

April 2013

Dear AISD Educator,
As you know, middle school teachers are involved in the implementation of academic interventions in their classrooms every day. However, there is limited research on teachers' knowledge and beliefs about scientifically based interventions. Your expertise and opinions as a middle school teachers have the potential to help professionals and schools better serve students who are struggling learners.
You are invited to participate in a brief survey as part of my research study about the implementation of scientifically based interventions. The survey should take no more than 15 minutes of your time. Thank you in advance for your assistance.

This study has been approved by the AISD Department of External Research and Legal Department.

All participants completing the survey will automatically be included in a drawing for a $100 Visa Gift Card. You will be notified by email if you are selected in the random drawing.

To take the survey, please go to:
https://utaustined.qualtrics.com/SE/?SID=SV_8920l4mdxKg55hb *(Please copy and paste this URL address into your browser if it does not automatically take you to the link.)*

Your input is very important to me. Thank you for your time and expertise!

If you have any questions regarding the survey feel free to contact:

Mary Bach
Doctoral Candidate
Special Education Administration
The University of Texas at Austin
mbach@utexas.edu

STUDY NUMBER: 2012-10-0071 Approval Date: 4/19/2013 Expires: 4/18/2016
Consent to Participate in Internet Research
Identification of Investigator and Purpose of Study
You are invited to participate in a research study, entitled "Implementing Scientifically Based Interventions: Teachers' Knowledge and Beliefs."
The purpose is to examine Middle School teachers' knowledge and use of Scientifically Based Interventions in their classrooms. Your participation in the study will contribute to a better understanding of how teachers use Scientifically Based Interventions.
If you agree to participate:

- This on-line survey will take approximately 15 minutes of your time.
- Your responses will be anonymous and only group data will be analyzed
- Your participation is voluntary. You may decline to answer any question and you have the right to withdraw from participation at any time. Withdrawal will not affect your relationship with your school, school district or The University of Texas at Austin in anyway.
- You will not be compensated.

Risks/Benefits/Confidentiality of Data

There are no known risks with this study. The survey is anonymous. There will be no costs for participating, nor will you directly benefit from participating. The potential risk to the participants is no greater than everyday life. Your name and email address will be kept during the data collection phase for tracking purposes only. Qualtrics, the survey instrument, allows distribution of surveys to specific emails with the responses recorded anonymously. A limited number of research team members will have access to the data during data collection. Any identifying information will be destroyed after the survey has been sent, making it impossible to identify individual respondents.

Participation or Withdrawal

If you do not want to receive any more reminders, or do not wish to participate in the study, you may email Mary Bach at mbach@utexas.edu.

Contacts

If you have any questions about the study or need to update your email address contact the researcher Mary Bach at 512-619-6279 or send an email to mbach@utexas.edu. This study has been processed by the Office of Research Support and the study number is [2013-10-0071]**.**

Questions about your rights as a research participant.

If you have questions about your rights or are dissatisfied at any time with any part of this study, you can contact, anonymously if you wish, the Office of Research Support by phone at (512) 471-8871 or email at orsc@uts.cc.utexas.edu.

We thank you for your help and look forward to your participation.

To participate, click on the following link
https://utaustined.qualtrics.com/SE/?SID=SV_8920l4mdxKg55hb

Thank you.

If you wish feel free to print a copy of this document for your records.

Follow this link to the Survey:
Take the Survey

Or copy and paste the URL below into your internet browser:
https://utaustined.qualtrics.com/WRQualtricsSurveyEngine/?SID=SV_8920l4mdxKg55hb&Preview=Survey&_=1

Follow the link to opt out of future emails:
Click here to unsubscribe

Follow this link to the Survey:
Take the Survey

Or copy and paste the URL below into your internet browser:
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Vita

Mary Bach was born and raised in Iowa. At an early age, she became interested in teaching young children. In high school, she joined Future Teachers of America. After graduating from Prairie Community High School, she attended the University of Northern Iowa and, in 1972, was awarded a B.A. in elementary education. Her first teaching assignment was working with preschool children. She attended Drake University where she earned her Early Childhood Endorsement. For the next twenty years, she served as an early childhood and elementary teacher in the Des Moines Independent School District.

Ms. Bach moved with her family to Austin, Texas in 1994, with the goal of teaching elementary school until she retired. However, she was provided an opportunity to work with students with dyslexia. Her interest in how students learned to read became a passion. She completed the requirements for her Special Education certification and took training to be become a Master Reading Teacher and a Certified Academic Language Therapist. For nine years, she taught students how to read in the Del Valle Independent School District. In 2005, she became an instructional coach at a middle school in the Austin Independent School District. Because she enjoyed working with teachers, she taught Texas Teaching Fellows, an alternative teaching certification program, for six years during the summers and at night.

Ms. Bach enrolled at The University of Texas at Austin and was awarded a Masters of Education in Curriculum and Instruction in 2002. In 2003, she began the doctoral program in the Special Education Administration Program at The University of Texas at Austin. She is currently an instructional coach for the Strategic Instruction Model program and a reading intervention teacher on a middle school campus. She resides in Austin, Texas.

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This dissertation was typed by Mary Beth Bach.